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Arts and Sciences;

CONTAINING

FULL DESCRIPTIONS OF THE PRINCIPLES AND DETAILS OF

EVERY NEW PATENT,

ALSO

Original Communications

ON SUBJECTS CONNECTED WITH

SCIENCE AND PHILOSOPHY,

PARTICULARLY SUCH AS EMBRACE THE MOST RECENT

INVENTIONS AND DISCOVERIES

IN

Practical Mechanics.

BY W. NEWTON,

CIVIL ENGINEER AND MECHANICAL DRAFTSMAN.

Assisted by several Scientific Gentlemen.

VOL. VI.

[SECOND SERIES.]

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PREFACE.

IN closing the present volume of the London Journal of Arts and Sciences, the Editor avails himself of the opportunity to express his acknowledgments, for the very flattering support which he has continued to receive from a numerous list of subscribers and contributors, during the twelve years that this Journal has been in course of publication; without attempting to claim to himself any merit for the manner in which the literary and graphic departments of the work have been conducted (which the public can best appreciate) he has great confidence in alluding to one peculiar feature embraced in this Journal, which no other publication has ever attempted, viz. a complete *Repertory of* EVERY *New Invention* that has been made the subject of PATENT RIGHT since the commencement of the work.

In pursuing this arduous undertaking, it must be obvious that many and considerable difficulties would present themselves in its accomplishment, which have occasionally retarded the publication of some few Inventions, but have never finally excluded any.

From the great increase in the number of Patents granted of late years, it has not been found practicable to bring up all their reports so early as might be wished; but in this and the preceding Journals, constituting Twenty Volumes (including the First Series) the specifications and descriptions of all the new Patent Inventions which have been Inrolled in Chancery, up to the beginning of the year 1828, will be found fully reported, with the graphic illustrations accompanying them, in a series of more than Three hundred plates; and though the *whole* of the specifications and descriptions of the Patent Inventions inrolled in the following years have not yet been reported, nearly Two hundred and fifty subsequent Patents have been described in the pages of the Journal, and those which still remain to be noticed will very shortly appear.

In addition to this important feature—the full explanation of the principles and details of *every new Patent Invention*, a very extensive collection of other scientific information is inserted in the work, constituting the London Journal of Arts and Sciences, a most complete Magazine of Mechanical Art and Journal of its progressive improvements.

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SECOND SERIES.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXI.

[SECOND SERIES.]

Recent Patents.

To Simon Thompson, *of Great Yarmouth, in the county of Norfolk, Compass Maker, for his having invented or found out certain improvements in Piano Fortes.*—[Sealed 27th Feb. 1830.]

The object of the Patentee is to construct Piano Fortes of the upright kind in a more compact form than has heretofore been done, and the improvement which is principally in the form of the key and action part, allows of a new arrangement of the mechanism by which the instrument, though of the upright construction, stands entirely below the face of the performer, and by that means does not impede the free vibration of the voice in singing.

SPECIFICATION.

"My invention of certain improvements in Piano Fortes consists in a new arrangement of the parts of that descrip-

tion of instrument called the *upright piano forte*; by which arrangement I am enabled to construct the instrument much below the usual height, and also to make the top of the piano forte a flat surface, as a table, without any projection above the part which is usually called the lock board. I am also by this arrangement enabled to make a much more simple action of the keys and hammers, for producing tones from the strings of the instrument than has heretofore been used in upright piano fortes, and to allow the sound to escape more freely. The effect of this arrangement is that the tone of my improved instrument sounds much louder than other upright piano fortes; and the common objections made to that construction of instrument, by vocal performers, when accompanying their own voices on an upright piano forte, "that the silk front or face absorbs the voice," is completely obviated. I also have, by varying the mode of stringing the common construction of upright grand piano fortes, been enabled to make a more simple action, and produce louder tones than heretofore has been effected in the usual construction of those instruments. All which improvements are set out in the accompanying drawings (see Plate I.), and will be fully understood by the following description thereof.

"Fig. 1, is a front view of an upright piano, on my improved construction, the top of which is intended to be perfectly flat. Fig. 2, is a horizontal view of the same, but with the lock board removed, exposing the keys, and part of the interior; and fig. 3, is a vertical section, taken transversely through the instrument, about the middle, exhibiting the parts called the action. The similar letters referring to the same respective parts in all those figures.

"As the construction of a piano forte is well known to persons connected with their manufacture, it is unnecessary to enter into a full description of the instrument; I

shall therefore confine myself as much as possible to my improvements thereon; *a, a, a,* is the body of the piano forte containing the strings, sound-board, bridges, &c. and all parts requisite for a complete instrument; *b, b,* is the lock-board, covering the keys which are placed upon the key board or frame, in the usual way. In fig. 3, the shape of the keys *c, c,* will be best seen, which it will be perceived are bent down in order to gain room, and that proper motion may be communicated to the hammer, by the part of the action usually termed the grass-hopper, so as to make it strike at the proper place, on the strings of the instrument; *d,* is the grass-hopper, which acts on an under hammer *e,* hinged on the rail *f*; this hammer *e,* acts upon another hammer *g,* above it, hinged the reverse way on the rail *h,* which hammer *g,* communicates motion to the upper or striking hammer *i,* hinged on the rail *k,* and may have any of the common checks connected to it, to prevent its recoil or re-action on the strings. To the lower hammer *e,* is connected the end of the perpendicular wire or guide rod *l,* which gives motion to a damper of the common construction, fixed over the striking hammer in the usual way; *m,* is the rail that the striking hammer rests against, when out of action.

" Fig. 4, is a transverse section (taken through an instrument in the same direction as fig. 3,) shewing a variation in the arrangement of the parts constituting the action suitable to my improved construction of instrument, but which action has only one under hammer, as in this arrangement the ordinary sticker is employed; *c, c,* is the key bent lower down than in the previously described construction, in order to gain room for the sticker *n,* which acts upon the striking hammer *i,* in the usual way. Fig. 5, is a front view of another instrument intended to be made higher than those above described, or as common upright

piano fortes usually are, to which the the same action may be applied, and with either straight or bent keys. By this arrangement, the parts called the stickers used in upright piano fortes are dispensed with, and all parts of the strings above the dampers left perfectly free of any incumbrance or covering, except the silk front. In this construction the power of applying my improvements is obtained, by the particular mode of stringing the instrument shown in the drawing.

"As I have necessarily shown and described many parts which are not new, to render the arrangement and action of the instrument better understood, I hereby declare that I do not mean or intend to claim as my invention, any of the parts, which are commonly used in the construction of piano fortes; but I do claim as my invention, 1st. The particular arrangement of the parts of the piano forte, and of the action, as shown, and particularly the bent shape of the keys, by which the instrument may be made less lofty than heretofore; which bent shaped keys can also be used to advantage, either in horizontal, square, or grand piano fortes, and by these means those instruments may be built much lower, and yet afford sufficient room for the knees of the performer, and the lock board of a more ornamental shape."—[*Inrolled in the Rolls Chapel Office, Aug.* 1830.]

Specification drawn by Mr. Newton.

To Peter Taylor, *of Hollinwood, in the county of Lancaster, Flax Dresser, being one of the people called Quakers, for his invention of certain improvements in Machinery for heckling, dressing or combing flax, hemp, tow, and other fibrous materials.*—[Sealed 29th March, 1828.]

The subject of this Patent is a machine for heckling or combing flax and hemp, in order to clean it from the

woody particles of the bark which encloses the filamentous parts of the stalk. After breaking the bark by beating, the material is fastened between clamps and placed in the machine, where by a succession of actions of the mechanism, the filaments in passing through the combs or heckles, are separated from the broken parts of the stalk, and rendered clean, and fit for the further operations of spinning. The construction of the machine, and its various parts, are shewn in Plate II.

SPECIFICATION.

"Fig. 1, is a side view of a heckling machine, constructed with my "improvements for the heckling, dressing, or combing of flax, hemp, tow, and other fibrous material;" and these improvements consist of certain arrangements of machinery in which the flax or other fibrous material is submitted to the action of the heckles. These arrangements or parts of machinery, constitute the machine represented at fig. 1.—Fig. 2, is a plan of the same machine. Fig. 3, is a side view seen in the opposite direction to fig. 1, and fig. 4, is an end view of the same machine.

"In describing this machine, I shall divide the action of its different parts into four movements. 1st. The movement by which the strick or portion of flax, is gradually lowered and brought in contact with the hackles. 2ndly. The movement of the heckles. 3rdly. The arrangement of parts or movement by which the heckles are cleared or freed from the tow collected in them; and 4thly, the movement by which the strick of flax is withdrawn from the action of the heckles when finished.

"Figs. 7, 8, 9, 10, 11, 12, 13, represent the different parts of a holder, or clamp, in which the strick of flax is firmly placed, preparatory to taking it to the machine, and

are various views of the same part of the holder or clamp: and it is across this part, that the strick of flax is regularly spread or divided between the projecting screws *a, a, a*.

" Figs. 11 and 12, are side and end views of a part of the holder or clamp, which fits immediately on to the part 7, receiving the screws *a, a, a, a, a*, through the corresponding apertures *b, b, b*. Fig. 13, represents five nuts, which are then placed on the screws *a, a, a, a, a*, in order to hold the parts 7 and 11, firmly together, the strick of flax being first placed between them.

" This part of the operation is performed by boys, or others, whose business it is to supply the machine with flax or other material thus placed in holders or clamps.

" By reference to fig. 4, the position in which the strick of flax is placed, will be seen at the hooks B, B, where one of the holders marked A, is suspended, and from which the flax hangs down in a perpendicular position. In reference to figs. 2, and 4, C, C, are fast and loose pullies, by means of which the machine is driven by a strap or otherwise from any adequate first moving power, and from the fast pulley power is conveyed by means of the shaft D, to the train of wheels E, F, G, H, I, K, (see fig. 3,) and through the perpendicular shaft L, to the bevel wheels M and N, which last is firmly fixed to the shaft or roller O. The roller O, passes across the machine, as seen in plan, fig. 2, and carries the two pinions P, P, which gear into the racks Q, Q, (see figs. 1 and 4,) these racks move freely in a perpendicular direction, being steadied or held by the friction rollers *q, q, q*, as seen at figs. 1, 3, and 5, and it is by means of the action of the pinion P, P, on the racks Q, Q, that the horizontal bar R, to which they are attached, is gradually lowered along with the holder A, containing the strick of flax: and it is this gradual or progressive lowering, effected by the train

of movements hereinbefore described, which I call the first movement of the machine.

"Opposite and parallel to the roller O, which revolves along with the pinions P, P, is a flat bar S, as seen at fig. 2, placed in an oblique direction, having its lower edge even with the lower surface of the cylinder O, and it is between the edge of the part S, and the cylinder O, that the strick of flax is gradually drawn by the revolving cylinder O, as it is lowered by the bar R, as hereinbefore described. The parts S, and O, also serve to steady or hold firm the strick of flax at the time when the heckle is inserted into it, as described.

"The second movement of this machine, or that by which the heckle is inserted into the strick of flax, and drawn through it for the purpose of dressing or heckling, is effected in the following manner:—T, T, figs. 1 and 2, represent heckles of the ordinary construction, which are firmly fixed or attached to the parts U. On reference to the plan, fig. 2, it will be seen that the parts U, U, with the heckles attached to them, are parallel with the roller O, and the part S, between which the flax is conducted; and also that they are held in this parallel position by the arms V, V, V, V, which arms are connected to cranks on the shafts W, W.

"On referring to fig. 1, it will also be seen that the arms V, V, V, V, are also connected to the cranks, on the lower shaft D, by means of the part X. Now the shafts W, W, and the shafts D, D, are revolved at an equal and regular speed by means of the train of wheels *y, y, y, y, y, y*, figs. 1 and 2: and it is by the revolution of the cranks placed in the shafts D, D, that the perpendicular or up and down motion of the heckles for the purpose of heckling is effected; at the same time that the horizontal or back and forth motion of the heckles for the purpose of inserting them into the strick of flax at the commencement of

the downward stroke of the heckles, and withdrawing them at the end of the lowest point, is effected by means of the cranks on the shafts w, w.

"Thus supposing the wheels *y*, *y*, *y*, *y*, *y*, *y*, to revolve in the direction of the arrows on the periphery, it will be seen by reference to fig. 1, that the heckle on the lower arm v, is in the act of receding from the strick of flax by means of the crank on the shaft w, to which it is attached, while the upper arm v, with the heckles with which it is connected, is forced forward towards the strick of flax by by means of the cranks on the shaft w, to which it is attached.

"The third movement of this machine, or that by which the heckles are cleared of the tow which accumulates upon them, is effected by a part shewn at fig. 14, in a side view, and in plan, at fig. 15. This part is constructed of thin sheet iron, or other suitable material, and holes being made through the wood of the heckles and the part u, to which they are attached, the rods *ć*, *ć*, are inserted therein, in the position best seen at fig. 4, whose part of the heckle teeth are omitted for the purpose of shewing the position of part 14 and 15.

"Referring to figs. 1 and 2, the rod *e*, which is attached to the part *ć*, by means of a connecting rod *t*, (see fig. 2) passing at the back of the heckle, will be seen connected by a small stud at its opposite end, to the rod *d*, *d*. This rod *d*, is also attached to the lever v, and passes at its lower extremity through the loop or guide *e*; and it will be seen at fig. 1, that when the parts v, and the heckles are at their greatest elevation, or the commencement of the stroke, the clearer is, by the position of the rods *d*, *c*, held back, and placed at the bottom of the heckle pins, leaving them free to enter the flax: but as soon as the heckles arrive at their lowest position, or the end of the stroke, the rods *c*, and

d, become so situated as to force forward the clearer, and deliver the tow from the heckles. The tow thus freed from the heckles is allowed to fall through apertures in the floor, as shewn by dotted lines beneath fig. 1.

The fourth, or last movement of this machine is that by which the bar R, which carries the holders along with the flax, is elevated or raised at the termination of the downward traverse of the racks Q, Q. By reference to figs. 2, 3, and 4, it will be seen that the upper part of the shaft L, is steadied or held by a lever *f*, *f*, which vibrates freely on its fulcrum *g*, and also that there are bevels placed immediately above and below this vibrating lever, the lower one of which gears into the bevel N, and produces the downward motion of the racks Q, Q, as seen in fig. 4, while the upper one marked *m*, runs free; but as soon as the racks Q, Q, and bar R, shall have lowered sufficiently to heckle the whole of the strick, the stop *h*, which is fixed by a set screw on a perpendicular rod, connected and moving along with the rack, strikes a projection *l*, from the forked piece *k*, *k*, *k*, which is vibrated in the direction shewn by dots, at fig. 4; and the end of the lever *f*, *f*, already mentioned, being within the fork of the part *k*, *k*, *k*, is carried in the opposite direction, and the wheels M, and N, thrown out of gear. At the same time, and by the action of the part *k*, *k*, *k*, on the lever *f*, *f*, which throws the wheel M, and N, out of gear, the mitre wheels *m*, and *n*, are thrown into gear. By reference to fig. 6, the parts now being described will be seen on a larger scale, where the same letters are retained to indicate the same parts.

"Attached to the bevel *n*, which runs loose on the shaft O, is a pulley which is acted on by a weight seen at *p*, figs. 3 and 4; by means of the weight, the stop or pin at the back of the pulley, as seen at fig. 6, is held up, and is made con-

stantly to follow a corresponding stop connected with the shaft o, when the bevels *m*, and *n*, are thrown into gear by the downward traverse of the racks Q, Q, by the means already described, the wheel *n*, has to make one entire revolution, before the stop, at the back of the pulley, comes into contact with the opposite side of the corresponding stop, which it has followed by means of the weight *p*, and during the period of the revolution of the wheel *n*, the pinion B, along with the racks Q, Q, remain at rest, thereby allowing time for that part of the strick of flax which is nearest to the holder to be effectually heckled.

" As soon as the bevel *n*, has made one revolution, and brought the pin on the back of the pulley annexed to it, to the position seen in fig. 6, it carries the shaft o, along with it, which acting by means of the pinion P, P, on the rack Q, Q, in the manner already described, elevates it to its former position, when the operation removes the holders, and replaces them by other holders containing a fresh portion to be heckled.

" At this period, or when the racks Q, Q, are at their greatest elevation, the position of the forked piece *k*, is reversed, and again placed as seen at fig. 3, by means of the stop *i*, which acts in a similar manner to the stop *h*, already described, the wheels *m*, and *n*, are thrown out of gear, and the wheels M, and N, are thrown into gear, which, reversing the motion of the pinion B, the progressive lowering of the racks Q, Q, is recommended.

" Fig. 5, represents a side view of a machine similar to that already described, with the exception of the horizontal or back and forth motion, for the purpose of inserting the heckles into the flax, and withdrawing them at the end of the stroke, which is produced by a different arrangement of parts; D, is the driving shaft of the machine, from which the various movements are carried, as already

described, with the exception of the one of which I am about to speak; *r, r,* is a lever vibrating freely on its fulcrum *x*, at the lower part of which is a slot or opening, to admit the projection or pulley attached to the crank *z*. This crank revolving on the same shaft with the wheel *y*, carries or vibrates the lever *r, r*, at every revolution of the wheel *y*. At the lower extremity of the vibrating lever *r, r*, will be seen connecting rods, by which it is attached to the levers 16, 16, which vibrate freely on fulcrums 17, 17, and are attached to the parts v, v, at their upper extremity.

" Now, supposing the wheels *y, y*, to revolve in the direction of the arrows marked in their periphery, it is obvious that the consequent vibration of the lever *r*, would force forward those heckles which are at the greatest elevation, or the commencement of the stroke, at the same time that it recedes or draws back the opposite heckles, which are at the lowest elevation, or the termination of the stroke; and the same effect may be produced by attaching the connecting rods direct to the crank *z*, without the intervention of the lever *r, r*, and by reference to the parts connected with the third movement, or that part of the machine for clearing the heckles of the tow, it will be seen that their action is similar in all respects to that of the machine hereinbefore described.

" Having now described a machine constructed with my improvements in machinery for heckling or dressing hemp, flax, and tow, or other fibrous materials, I do hereby declare, that I do not claim any detached or separate portions or parts of such machinery, such parts or portions being well known, and in common use, but I do claim such combination or arrangement of parts as hereinbefore described, by which the four movements of the machine are effected. And lastly, I do declare, that the

speed of the various parts of my machinery hereinbefore described, as well as the method of producing the same, may be modified and varied, at the pleasure of the party superintending the construction or use of the machine. All which variations and modifications producing the same effects and results may be attained by any person of competent skill, and fit to be entrusted with the construction of machinery of this or a like description.—[*Inrolled in the Inrolment Office, Sept.* 1828.]

To HENRY HIRST, *of Leeds, in the county of York, Clothier, for his having invented certain improvements in manufacturing Woollen Cloth.*—[Sealed Feb. 27, 1830.]

SPECIFICATION.

"MY improvements in manufacturing woollen cloths apply to that part of the process of finishing cloth, where a permanent lustre is given to the face of the cloths, usually by a process called roll boiling, that is stewing the cloth when tightly wound upon a roller in a vessel of hot water or steam.

"As there are many disadvantages attendant upon the operation of roll boiling, such as injuring the cloths by over heating them, which weakens the fibre of the wool, and also changes some colours. I propose to substitute in place of it, a particular mode of acting upon the cloths, by occasional or intermitted immersion in hot water, and also in cold water, which operations may be performed either with or without pressure upon the cloth, as circumstances may require.

"The apparatus which I propose to employ for carrying on my improved process is shewn in the accompanying drawing, (see Plate II.) Fig. 6, is a front view of the apparatus, complete and in working order. Fig. 7, is an end

view of the same; and fig. 8, is a section taken transversely through the middle of the machine, in the direction of fig. 7; *a, a, a,* is a vessel or tank, made of iron or wood, or any other suitable material; I prefer it to be sloping at the back and front and perpendicular at the ends. This tank must be sufficiently large to admit half the diameter of the cylinder or drum *b, b, b,* to be immersed in it, which drum I propose to make about four feet diameter, and about six feet long, or something more than the width of the piece of cloth, intended to be operated upon. This cylinder or drum *b, b,* I construct by combining segments of wood cut radially on their edges, which I secure by screw bolts to the rims of the iron wheels, having arms with an axle passing through the middle.

"The cylinder or drum being thus formed, and rendered smooth, on its periphery, and mounted upon its axle in the tank, I now wind the piece of cloth upon it as tightly as possible, which I do by placing the cloth in a heap upon a stool, as at *c,* fig. 8; and having passed its end over and between the tension rollers, *d, e,* as shewn, and then secured it to the drum, I draw the cloth progressively from the heap, between the tension rollers, which are confined by a pall and ratchet, or otherwise on to the periphery of the drum, by causing the drum to revolve upon its axis, until the whole piece of cloth is tightly wound upon the drum; when I bind it round with canvas, or other wrappers, to keep it secure.

"If the tank has not been previously charged with clean and pure water, I now fill it nearly to the brim, as shewn at fig. 8, and then opening the stop cock of the pipe *f,* which leads from a boiler, I allow steam to blow through the pipe, and discharge itself at the lower end, by which means I raise the temperature of the water in the tank, to about 170 deg. (Fahrenheit.)

"Before the temperature of the water has got up, I put the drum in slow rotatory motion, in order that the cloth may be uniformly heated throughout, that is I cause the drum to turn, at the rate of about one rotation per minute, and in this manner I continue operating upon the cloth by immersing it in the hot water, and then passing it through the cold air in succession, for the space of about eight hours, which gives the cloth a smooth soft face, the texture not being rendered harsh, or otherwise injured, as is frequently the case by roll boiling.

"The means by which I have found it convenient to give the uniform, rotatory motion to the drum, is shewn in fig. 6, in which *g*, is an endless screw or worm, placed horizontally, and driven by a steam engine, or any other first mover employed in the factory. This endless screw, takes into the teeth of and drives the vertical wheel *h*, upon the axle of which, the coupling box *i*, *i*, is fixed, and consequently continually revolves with it. At the end of the shaft of the drum, a pair of sliding clutches *k*, *k*, are mounted, which when projected forward, as shewn by dots in fig. 6, produce the coupling or locking of the drum shaft to the driving wheel, by which the drum is put in motion, but on withdrawing the clutches *k*. *k*, from the coupling box *i*, *i*, as in the figure, the drum immediately stands still.

"After operating upon the cloth in the way described, by passing it through hot water, for the space of time required, the hot water is to be withdrawn by a cock at the bottom or otherwise, and cold water introduced into the tank in its stead: in which eold water, the cloth is to be continued turning in the manner above described, for the space of twenty four hours, which will perfectly fix the lustre that the face of the cloth has acquired, by its immersion in the hot water, and leave the pile or nap to the touch, in a soft silky state.

"In the cold water operation, I sometimes employ a heavy pressing roller *l*, which being mounted in slots in the frame or standard, revolves with the large drum, rolling over the back of the cloth as it goes round. This roller may be made to act upon the cloth, with any required pressure, by depressing the screws *m*, *m*, or by the employment of weighted levers, if that should be thought necessary."—[*Inrolled in the Roll's Chapel Office, August*, 1830.]

Specification drawn by Mr. Newton.

To James Stewart, *of Store-street, Bedford-square, in the county of Middlesex, Piano Forte Maker, for his having invented certain improvements on Piano Fortes, and in the mode of stringing the same.* [Sealed 22d March, 1827.]

There are three features of improvement proposed under this Patent; the two first, consist in certain novelties in the construction and adoption of the dampers of double action Grand Piano Fortes; the last is in the manner of attaching the strings to their pins, on all description of piano fortes.

In the first place it is proposed, instead of bringing the damper wire immediately over the string which is to be acted upon, to place it two semitones or one whole note off. As for instance, if the string to be acted upon is F, then place the wire damper between the string of G and G sharp, and so of the damper wires of all the other strings. The wires of these dampers are to be placed further back in the instrument than usual, in order to leave room for the introduction of a stopper, to prevent the recoil of the hammer after the note has been struck.

The second improvement is taking off the weight of the dampers, to render the touch of the instrument delicate, which is effected by partially raising the damper lever, and only allowing a part of it to bear upon the key.

Third. It is proposed, instead of forming a loop at the end of the string, for the purpose of attaching it to the hitch pin, to fix a very strong hitch pin, and to pass the string round it, bringing the end of the string back again to another tightening pin, and so causing one string to form two unison cords. It is stated that the friction of the string, on the hitch pin, will be sufficient to hold it, and to allow of the string on each side, constituting two cords to be tuned separately.—[*Inrolled in the Inrolment Office, Sept.* 1827.]

To MATTHEW BUSH, *of Dalmonach Printfield, near Bonhill by Dumbarton, North Britain, Calico-printer, for his invention of certain improvements in Machinery or apparatus for printing calico and other fabrics.*—[Sealed 27th March, 1827.]

THE Patentee commences his Specification by describing the ordinary construction of apparatus, by which calicos and other goods of that description are printed in several colours at one operation; *viz.* by means of a machine having a pressing cylinder or top roller, as it is called, mounted on an axle turning in a standard or frame with several engraved or embossed cylinders or printing rollers, placed round in contact with its periphery, each of which cylinders or printing rollers being coloured or inked by ductors and other suitable apparatus, give the separate portions of the pattern in its own particular colour to the sheet of calico or other material passed between the seve-

ral printing rollers and the periphery of the pressing cylinder.

There is, however, the Patentee says a considerable inconvenience in the employment of this apparatus, as the impression upon the calico from one printing cylinder passes on to the next printing cylinder, before the colour of the first impression has become dry or set; and the consequence is, that the colours by that means run together, and produce an imperfect or confused pattern upon the face of the calico under operation.

To remedy this inconvenience is the object of the present invention, which consists in a novel arrangement of the printing apparatus, and the introduction of heated surfaces between each printing roller; by which means, as the calico passes through the machine, the colour of each distinct impression becomes dried upon the calico before another impression is given.

Plate II. fig. 18, is a vertical section of the machine upon the improved construction for printing three colours, in which three distinct pressing cylinders, or top rollers as they are called, are employed, one to each of the printing cylinders or rollers; *a, b, c,* are the three engraved or embossed rollers or cylinders, which give the impressions; *d, e, f,* are the three pressing cylinders, or top rollers; *g,* is the roller on which the calico or other material is rolled, ready to be operated upon. The rollers *a,* and *b,* are engraved on their smooth surface, and the roller *c,* is embossed or carved in relief as type, which give portions of the pattern severally; and in contact with these rollers *a, b,* are the ductor rollers *h, i,* turning in troughs, which supply the colour to the printing rollers. There are also scrapers as usual, which clear off the superfluous colour from the peripheries of these rollers, while the raised or embossed roller *c,* receives its colour from a travelling

felt, which is carried through a colour trough *k*, and over three tension rollers, and passes in contact with the printing roller *c*.

All these rollers have their proper apparatus for adjustment, as in other calico printing machines, and are driven by toothed wheels, affixed to the end of their axles, and also to the axles of the top rollers, or pressing cylinders, which by that means cause them all to revolve simultaneously, and to bring the several parts of the pattern to fit together, called *registering*.

The calico now being drawn off its roller *g*, is passed under a tension roller, and brought between the printing roller *a*, and its pressing roller *d*, which causes that portion of the pattern, engraved upon the roller *a*, to be printed upon it in one colour. Proceeding onward the calico next passes between the second pair of rollers *b*, and *e*, and another portion of the pattern is printed as in the former, but in a different colour, and proceeding still further, the calico passses next between the rollers *c*, and *f*, which gives the finishing portions of the pattern.

It has been before said that a great inconvenience is felt by the moist colour of a second impression coming upon those parts of the first impression which are not yet dry; to obviate this, metal boxes *l*, and *m*, are attached to the frame of the machine between the pressing rollers, which boxes are intended to be heated by steam, in order that the colours upon the calico may be dried as it passes from one printing roller to the next. There are also endless blankets or felts passed over each of the pressing cylinders, to prevent the colours being mixed.

The employment of the steam boxes for drying the colours between each impression, forms a leading feature of the invention; and similar steam boxes *n*, *n*, *n*, *n*, *n*, *n*, are placed above to dry the endless blankets.

This mode of drying the colours upon the calico between every impression, is no doubt both convenient and efficacious; but with the exception of the particular arrangement of the parts of the machine, we see no feature of novelty, for by reference to the Specification of a Patent, granted to Doctor Church, dated 18th Feb. 1823 (see Vol. VII. of our First Series, p. 57, and Plate VII), we perceive that boxes heated by steam, or hot air introduced between three printing rollers, form part of the subject of his invention for printing calico and other fabrics in several colours.

A second feature of the present invention is a mode of distending the calico or other material evenly upon a table, so as to enable it to be printed by blocks, and cause the pattern to register with great accuracy. Fig. 19, is a side view of a table for block printing. Fig. 20, is an end view of the same; *a, a,* is the flat part of the table, formed by thick planks, or of stone, in the usual way; its upper surface is covered with blanketing or felt, which forms the bed, to receive the calico or other material about to be printed; *b,* is the piece roll from whence the end of calico is to be drawn over a roller *c,* on to the table. This piece roll is held by a ratchet and click, in order to keep the calico tight.

After passing the calico over the table lengthwise, it is conducted under tension rollers, for the purpose of drying it, and it is ultimately received on to the roller *d,* where it is rolled up.

The novel features of this apparatus are the means which are employed for drawing up the sheet of calico tight and even, supposing it to have shrunk by dying, in order to bring the different parts of the ground pattern into such situations as shall enable the blocks to be placed

upon the table in the ordinary way, to print the finishing parts of the pattern with accurate register.

For this purpose, the calico being drawn tightly over the table lengthwise, it may be strained yet tighter by means of sliding pieces or rails *e*, and *f*, at each end of the table, which pieces, or rails, have straight edges, intended to be pressed down upon the calico, and when it so happens that one side of the calico requires to be drawn tighter than the other, to bring the pattern square, then these straight edges may be depressed more at one side than the other, so as to produce a greater degree of tension.

These rails are held by spring catches in the sliding parts, which prevent their rising until liberated by the thumb of the workman.

The lateral tension is produced by two strips of metal turning over on hinge joints, which have points in them, seen best in the end view, fig. 20; *g*, is one of the strips of metal with its points, which being turned over upon its hinges, causes the points to take hold of the edge or selvage of the calico. The strip *h*, on the other side is turned over in like manner, and when its points have taken hold oft he selvage of calico, the strip is drawn back on sliding pieces, in which it is mounted, until the calico is extended to its proper dimension in a cross direction.

In order that the distension of the material under operation, may be rendered perfectly accurate, so as to fit the pattern on the block which is to finish it, there are register points, placed upon bars crossing the table at *i*, *i*, which being properly fixed to suit any particular pattern, the calico or whatever material is operated upon, is drawn up by the tension apparatus above described, until the certain parts of it meet the register points, when it is ready to

receive the printing blocks by which the pattern is to be completed.

When one length of the calico has been thus printed, the tension is taken off, and it is drawn forward over the series of rollers *k, k, k, k,* which by exposing the surface of the fabric, allows of that colour drying, before it is ultimately wound upon the roller *d.* Another length of the calico is now brought on to the table, and after being strained, is printed by blocks in like manner.—[*Inrolled in the Inrolment Office, September,* 1827.]

To Joseph Jones, *of Amlwch, in the county of Anglesea, North Wales, Gentleman, for his invention of an improvement, in certain parts of the process of smelting or obtaining Metallic Copper, from Copper Ore.*—[Sealed 16th July, 1828.]

This improvement is designed to assist the fusion of the metal contained in copper ore, and comes into operation after the ore has been brought into that state called regulus or coarse metal.

Regulus, the Patentee considers contains sulphuret of copper, with sulphuret of iron, and in order to cause the copper to run more readily he proposes to mix the regulus with a portion of copper ore that is free from sulphur; which, if not pure in its natural state, must be rendered so by calcination. The pure metal acts as a flux to the copper ore, and the iron then flows on the top, which may be taken off by skimming, or drawn away at the tap hole.

The quantity of copper ore required, will depend upon the state of the regulus, which will be readily found, and this process being repeated several times, will considerably expedite the operation of smelting.—[*Inrolled in the Inrolment Office, January,* 1824.]

To WILLIAM GRISENTHWAITE, *of the town of Nottingham. Esq. for a new process of making sulphate of Magnesia, commonly called Epsom Salts.*—[Sealed 11th August, 1828.]

THIS new process by which Epsom Salts are to be produced, is by mixing together magnesia, sulphate of lime, or plaster of Paris, with carbonic acid and water, which will form a sulphate of magnesia.

The magnesia is to be obtained either by precipitation from sea water, or by the common earthy precipitations, or from the magnesian lime stone. The same modes of evaporation and crystallization, are to be employed, as are usually practiced by chemists.

The Patentee claims to be the first, who has used sulphate of lime, and carbonic acid, for the production of the above salt.—[*Inrolled in the Inrolment Office, February,* 1829.]

To GEORGE POCOCK, [*of Bristol, Gentleman, for his invention of improvements in making or constructing Globes for astronomical, geographical, and other purposes.*—[Sealed 4th February, 1830.

THE subject of this Patent is the invention of delineating upon the external surface of a paper balloon, distended with common air, the outlines of the different continents, islands, rivers, and seas on the surface of the earth, which is called an improved construction of globe for astronomical purposes.

Looking at this apparatus as a scientific instrument, it is impossible to consider it with gravity; we do not

mean from the lightness of the paper when inflated, but from the gross absurdity of employing a globe of such flexile & insubstantial materials to determine my geographical or astronomical problem as to distance, space, or time.

The patent globes (such as we have seen) are made by pasting together a series of gores of thin paper, on which has been printed, by lythography, a very rude map of the earth; this, when perfectly joined together, is to be blown out as a globular balloon of about four feet diameter, and a tape with degrees corresponding to the circumference of the globe is provided, to be stretched over it as a quadrant of altitude, or as a meridian, by which the problems are to be worked, as upon the ordinary construction of artificial globes; but with the exception that they are firmly mounted, while the improved globe is intended to be rolled about that floor, bending in every direction out of its spherical figure.

When not in use, the globe may be folded up and carried in the pocket, and when required to be used, it may be distended by passing it to and fro a few times in the air, until it becomes filled, for which purpose a button is affixed in the place of the north pole, and an opening made in the paper at the south. But as this mode of filling the globe may be found inconvenient, there is a wind box provided if required, to which the south part of the globe may be attached. This box acts as a stand, and the globe is filled from below by bellows.

It is suggested that these globes may be distended by wire or cane hoops within, but then of course they cannot be very conveniently rendered portable.

It is also proposed to construct some of those paper globes, so that they may be suspended by the North Pole, bearing upon a point, beneath like a vase, and to turn round upon this point, by the rarifaction of air, heated by

a lamp within, which also will shew the globe transparently, and have a pretty effect. Lastly, it is recommended as a feature of some importance, that the paper of which the globe is constructed shall be made of Irish linen, in order that it may be less likely to tear.—[*Inrolled in the Inrolment Office, April*, 1830.]

AMERICAN PATENTS.

For an Improvement in forming the Nap upon Woollen Cloths, to Zachariah Allen.

This improvement consists in extending the cloth, upon which it may be required to raise a nap, very smoothly and firmly over a solid arbor, or edge, and in causing the wires, or cards, set in a cylinder, to act only upon that portion of the cloth which is passing in actual contact around, or over, the solid arbor or edge; thus bringing the wires to act by a gauge or screw with accuracy and certainty upon all parts of the face of the cloth, and at the same time to penetrate no farther or deeper into the texture of the fabric, than may be found proper to raise a nap without injuring the texture of the cloth.

The improvement herein claimed consists in causing the wires to act upon a portion of the surface of the cloth extended smoothly over a solid body, so that every part of the cloth, thus extended on a hard surface or solid body, may be brought under the action of the wires without a possibility of retracting therefrom, or bagging in the looser parts, and without having some portions of it more intensely acted upon than others, whereby the nap is not only unequally raised, but the cloth itself is subject to be chafed through and damaged, as is the case when it is attempted to raise a nap otherwise than when extended upon a hard, smooth surface or cushion.

For a composition called Leather Paper, to Ephraim F. and Thomas Blank.

THIS new and valuable invention or discovery, consists of the art of making a paper from the refuse parings or shavings of leather, which is peculiarly and admirably fitted for sheathing vessels; and which is believed to be superior to the sheathing paper, or leather, both of which are now in general use for that purpose. It may also (after suitable preparation,) be used for the most of the purposes to which leather is applied, as the manufacture of patent leather, caps, pocket books, and for all kinds of book-binding.

The mode of forming the patent leather paper, is similar to that of the manufacture of paper from rags. The shavings been ground, or beaten to a proper consistence, are put into a suitable mould, from whence they are taken to the press. The colour of this paper may be varied according to the quality of the shavings used, or by a chemical process. It may be brought to such a degree of fineness and whiteness as to be equal to the finest writing paper.

The subssribers claim the sole privilege of using their patent leather paper in the manufacture of any article to which leather or paper is applied.

For preparing straw, hay, or other vegetable substances for the manufacture of paper. Granted to William Magaw.

THE following endorsement has been made upon the specification at the patent office.

"Improvement in the manufacture of paper, for which

two pentents have been granted to the said William Magaw, one dated on the 8th day of March, 1828, the other the 21st day of May, in the same year; both of which patents being hereby cancelled on account of defective specifications." The new specifications is as follows.

This improvement or discovery consists in the use of ley and its salts, in preparing straw, hay, or other vegetable substance, for the manufacture of paper, in the following manner, viz. To one hundred and twenty pounds of straw, or hay, take the ley procured from three or four bushels of ashes, or from fifteen to twenty pounds of the salts of ley, according to the quality; dilute it with a sufficiency of water to boil the straw or hay, which need not be all immersed at the commencement, as it will sink during the process of boiling. Boil the materials together until the vegetable matter and the knots become soft, or pulpy; or steep the materials in the solution several days until the same effect is produced; draw off the remaining liquid and rinse the materials to cleanse them from any dirt, or sediment, then grind them in the usual way, to be manufactured like rags into paper.

The petitioner claims as his exclusive improvment or discovery, the use of the ley, and its salts, and the mode of preparing the materials so as to render them fit for the manufacture of paper.

For certain improvements in the process of finishing Woollen Cloths. To Zachariah Allen.

This improvement consists in laying the folds of woollen cloths smoothly between metallic plates, and in this state immersing the cloth in steam or heated water, and in

subjecting the cloth, while thus immersed, in steam or hot water, to a heavy pressure, by means of a screw or otherwise. After remaining for a short time in this state, the cloth is allowed to become cold, or may be suddenly cooled by cold water, when it is to be withdrawn from the press. The cloth is then to be again folded in such a manner that those portions of the edges of the folds which were not subjected to pressure in the first instance, may be exposed to pressure in the second operation, which is to be completed in the same manner as the first. To prevent any marks or impressions upon the cloth, from the edges of the plates, the cloth may be laid in folds of its full width, and made to extend together with the edges of the plates of metal by means of thin boards introduced between them, and of less superficial dimensions than the plates.

LIVERPOOL & MANCHESTER RAIL ROAD.

The new line of road between Liverpool and Manchester is now complete, and open to the public for the conveyance of goods and passengers. In a mercantile point of view, this work is of great importance to the towns with which it communicates, and also the country round for many miles; but as a *novel work of art,* there is nothing which particularly claims our notice. The same means have been resorted to, and the same description of apparatus employed, which have been before proved in other parts of the kingdom. We subjoin a sketch of the history of this undertaking, which, like many other great works, has been nurtured into maturity by foster-fathers, leaving the real parent in forgetfulness.

The first idea of this undertaking originated as early as 1822, with Mr. William James, of London, a respectable surveyor, who, having witnessed the powers of the locomotive engines in the neighbourhood of Newcastle-upon-Tyne, conceived that they might be successfully employed on a railway for commercial purposes.

The insufficiency of the existing modes of conveyance for the increased commerce of Liverpool and Manchester, and the monopoly enjoyed by the three great canal interests,—namely, the Duke of Bridgewater's, the Mersey and Irwell, and the Leeds and Liverpool Canals, induced several spirited gentlemen to patronize the scheme. Surveys of a line were accordingly made by Mr. James, but principally at his own expense. Mr. James's line presented many advantages, but it was not thought proper to adopt it; and accordingly another survey of a line to the north of Mr. James's was made in 1824 by Mr. Stephenson, and a bill brought into Parliament in the following session; a prospectus was issued, setting forth the superiority of rail-roads over every other communication, describing the direction and nature of the line, which was estimated to cost 400,000*l.*, pointing out the disadvantages of the existing modes of conveyance, and the immediate benefits likely to accrue to the proprietors and to the country at large by the introduction of the locomotive engine, which was represented as a machine capable of developing the most extraordinary powers.

Such, then, was the scheme of the Liverpool and Manchester Railway, requiring, however, the sanction of the legislature before it could be carried into effect. The bill met with the most strenuous opposition, every clause was disputed, when, after a discussion of thirty-seven days in the committee of the House of Commons, it was

thrown out, in consequence of errors in the sections and survey.

Undaunted by this failure, the directors assembled their friends, discussed the objections, and finally determined upon applying once more to Parliament. Accordingly, early in July 1825, Messrs George and John Rennie were applied to, and the former of these gentlemen undertook the survey. On the 12th of August, the committee, on the recommendation of the engineers, determined to adopt a new line of way, passing considerably to the south of the former route.

In furtherance of this resolution, Mr. Charles Vignoles on behalf of Messrs. Rennie, was appointed to prepare the nesessary sections and plans of the projected undertaking. Mr. Vignoles executed his task with much ability, and such was the activity employed by these gentlemen, that the levels and sections of the two former lines, together with every requisite information, relative to the new line, were completed and deposited in little better than three months.

The directors then issued a second prospectus, adverting to the causes which led to the unsuccessful termination of their former efforts, acknowledging the errors that had been committed in the sections and levels, and that to avoid all chance of similar complaints in future, they had engaged the services of Messrs. Rennie, whose combined efforts, justified the fullest assurance, not only of the correctness of the plans and sections, but that the whole line was to be laid down with that skill and conformity with the rules of mechanical science, which would equally challenge approbation, whether considered as a national undertaking of great public utility, or as a magnificent specimen of art.

The second objection to the measure, was the interruption and inconvenience anticipated from the line of road

crossing various streets in Liverpool and Manchester. This difficulty was completely obviated by the new line recommended by Messrs. Rennie, which entered Liverpool by means of a tunnel and inclined plane, thus effecting a direct and most desirable communication with the King's and Queen's Docks. Various other advantages were pointed out by the new line, and as many objections had been made to the employment of loco-motive engines, the clause for using them was abandoned for the time, and every possible sacrifice, consistent with the furtherance of this great scheme, was made. In March, 1826, the measure was discussed with much opposition in a Committee of the House of Commons, and carried by a majority of 47. In the committee of the House of Lords, the opposition was again renewed, but the measure was finally carried by a majority of 28. Such is a brief outline of the parliamentary proceedings on the Liverpool and Manchester Railway, a measure which called into activity very powerful and conflicting interests.

The directors having thus (through the instrumentality of Messrs. Rennie) concluded their labours, it was natural to suppose that the execution of the undertaking would have been entrusted to them. The directors thought otherwise: the whole was most unaccountably taken out of their hands, and instead of being confided to Mr. James, the original projector, was again transferred to the hands of Mr. Stephenson.

This transaction excited the astonishment and disgust of many of the proprietors, some of whom withdrew from the direction, and others sold their shares. But the line had already been fixed by Parliament, and although some slight deviations, which could not be accomplished in the first instance, were afterwards made, the general plan of the undertaking, including the tunnel under the town of Liverpool, the cuttings and embankments in different parts

of the line, the great viaduct over the Sankey Valley, the road over Chat Moss, together with the bridges both over and under the railway, are, with a few exceptions, Messrs. Rennie's, and although attempts have been unjustly made to suppress the names of these gentlemen from all participation in this great work, the transaction is well known and duly appreciated by a large proportion of the public.

REPORT

Of the Select Commitee of the House of Commons on the Laws of Patents.

(Continued from page 371.)

Mr. John Farey called in; and examined.

Do you conceive the protection by a patent right is calculated to render new inventions more generally known and used?—Decidedly so; and particularly to give them every chance of attaining that perfection without which they cannot be brought into profitable use. It is not often that any individual has so much want of a new invention or improvement for his own use that it is worth his giving the requisite skill, time and money to bring it to bear, even if he has the means, and if he could not get some premium for allowing others to use it when perfected, or else keep it to himself to protect himself from competition, he would commonly remain a loser. Very large manufacturing establishments have a great advantage in that respect, because it costs them less to bring inventions to bear, and the profitfrom their own subsequent use is greater; and hence they do not care much about patents for small improvements; but such a protection, or at least the expectation of it, is essential to the establishment of great inventions in use.

Do you believe that many useful inventions would never have been prosecuted to the public advantage if they had not originally been worked under a monopoly?—By a monopoly I understand a confinement of trade in the hands of an individual; but if licences are granted under a patent, I think there is very little harm can be done by any patent right, for it makes no restriction, but only levies a small tax on a new and profitable

business, which can certainly bear that tax, or else it could not be levied. I am of opinion that many great inventions would never have been brought to bear as they have been, but for the encouragement offered by a patent. Mr. Watt's steam engine may be quoted as a great example: at the time Mr. Watt made his invention in his own mind in 1765, he was not a maker of steam engines, and none of the makers at that day had sagacity to see the value of his discovery before he had made an engine, nor would any of them have prosecuted his plan before it was proved, even if he had made them a present of the invention, much more to give him any thing for it; hence he had no means of making any profit from his invention, or any prospect of repayment for the great expense and labour necessary to bring it to bear in practice, unless he could have secured it to himself for a long term. Mr. Watt at the time he took out his patent in 1769, was a man of known talent, rising into business as a civil engineer; I have letters from him to Mr. Smeaton, and the answers, in which I find Mr. Smeaton considered him as acting most imprudently in quitting his proper professional pursuits to follow up this new invention, of which Mr. Smeaton had nevertheless a very good opinion as a philosophical discovery, but he considered that the difficulties of executing it with such perfection as to be fit for common use, would prove so insuperable that Mr. Watt would only ruin himself in the attempt. Under these circumstances it is certain that if Mr. Watt could not have obtained a patent, he would have done nothing further than make a plan, and at most publish his invention as a philosophical discovery, to do himself honour; in that state his engine might have remained till this day without any one useful application of it being made; for no man to this day, has made so much profit by the use of Mr. Watt's steam engine for his own work in any trade, as would have paid the costs of making a first engine and getting it to answer for his own use in real business, suppposing that Mr. Watt had published a complete plan for it; because the difficulties of a first execution are so great, and require talent and labour, as well as money, to overcome them. As it was, the hope of securing the invention to himself by patent, induced Mr. Watt to devote his whole time and his whole attention to bring his invention into use, and according to a phrase in one of his letters "he staked his all upon it." The words are, "I have been tormented with "exceedingly bad health, resulting from the operation of an "anxious mind, the natural consequence of staking every thing "upon the cast of a die; for in that light I look upon every "project that has not received the sanction of repeated suc- "cess." This was in April 1776, which was eleven years after

he had made the discovery of his principle, and seven years after he had obtained his patent, and during all which time he had devoted himself entirely to the execution; it is not to be supposed, that any one would have gone through all this toil, without being assured of a property in what cost such a man so much to acquire.

The history of Mr. Woolf's invention is very similar, with the difference that Mr. Watt having, through Mr. Boulton, obtained an extension by Act of Parliament, he acquired a large fortune during the prolongation. Whereas Mr. Woolf's patent expired before the actual outlay had been repaid; so that he is left a real loser by his invention. The previous inventors of steam engines, Mr. Savery in 1698, and Mr. Newcomen in 1710, were similar cases; they lost money. I have published a very full history of the origin and progress of the invention of the steam engine, which shows these facts in a striking light; but it is not peculiar to the steam engine, for all important inventions absolutely require the inducement of patent privileges, and which ought to be for longer terms than fourteen years.—The paper-making machinery is another instance; an act of extension was made, but the patent was afterwards set aside at law. The process of smelting iron ore with pit coal, instead of wood fuel, which has proved so important to this nation, is a strong case; the original patentee, Lord Dudley, is mentioned in the Statute of Monopolies, 21 James the First, 1628, but he ruined himself by his attempts to bring that invention to bear; and it was not till more than a century afterwards, that it was successfully practised.

Is it your opinion that many inventions are more quickly brought into general use, in consequence of a patent having been obtained for them, than they would have been if they had been left to themselves without a patent?—In almost all cases it is so, but in some few cases it is not; those are cases where a patent is taken by a manufacturer, to keep an improvement in his own hands, and prevent any others practising it, in competition with him. In all cases, an invention is more speedily brought to perfection under a patent than without, and in most cases it is more speedily brought into general use.

Will you explain the mode in which you conceive a patent operates in giving publicity to, and accelerating the introduction of an invention into general use?—It operates by inducing the manufacturer under a patent to set up workshops, with tools and means to make the new-invented articles in a large way, and with division of labour, consequently they are made better; also to send out travellers, and to advertise, whereby the new-invented articles are pushed into general use, as far as their

merits will admit, which would never happen from the languid and indifferent proceedings of individual workmen, who are engaged in some other trade, but who might now and then try to make the new articles one by one, without setting up proper tools or system, and who would consequently make bad articles, which, being sent out, would tend to bring the invention into disrepute, and thus spoil the market as fast as it was opened. I consider, in general, that the public derive some benefit from many patents for trivial inventions, such as snuffers, stirrups, lamps, cork-screws, and many other articles of domestic use, which can be of no material value to the public, for the use and exercise of the inventions; but by the operation of patents, the making and vending of patent articles (which have merit enough to sell) is multiplied and accumulated into considerable trades, which would never have arisen to any such extent without patents; because no individuals would have devoted themselves to have created such trades, if others could have supplied the demand as freely as themselves when created; but having been cultivated under a patent, and established as distinct trades by interested patentees, such trades continue to be permanent after the expiration of the patents. That is the origin of a number of considerable trades at Birmingham and Sheffield, and in London. They have arisen from the demand created by many trivial articles or inventions, which if they had been manufactured when new, by every individual who might have thought it worth while to try to make a few, would never have been advertised, and pushed into use, so as to create an extensive and distant demand; because the new articles first sent out by individual workmen, would be badly made, so as to fail in answering the purpose of the consumer, and the extension of the demand would thus be prevented; whereas a man, manufacturing under the protection of a patent, sets up at first in a large way, with the aid of tools, and establishes a system of subdivision of labour amongst his workmen, and makes a study of every part of the business; he advertises, and sends out travellers with the new articles, pays attention to rectify all complaints, and satisfy all the wishes of consumers, and by inducing shop-keepers and merchants to sell, and to export, establishes a trade. In short, by using every means which an extensive business in one article admits of, and which a divided business in a variety of articles does not admit of, he creates a new trade in making and vending articles, which are too trifling to be of any importance in other points of view.

Every patent is granted for the triple purpose of making, using and vending, the new invention. In what I designate as important inventions, the using of the invention is the greatest

item of its value to the public, the making may be another item, but of less importance, whilst the vending by shopkeepers may be scarcely worth notice; that is the case in steam engines, spinning machinery, gas lights, weaving, ropemaking, &c. But in others which I have called trivial inventions, although the use of them is not worth consideration as a public benefit (being only for individual convenience) yet the trade of making and vending of the new articles may nevertheless, by the operation of a patent, be rendered an object worthy of some encouragement.

For all these reasons I am of opinion, that the operation of some system of patent laws is indispensable to the protection of inventors, and to induce the efficient cultivation of important inventions; it is also favourable to the erection of trades upon trifling inventions. On the other hand, I do not know any instance in which a good patent law could be pernicious, because every patent that is really defective in invention, would work its own cure. Even under our present system, which I think a bad one, all those cases of patents for absurd inventions, which degrade the patent lists, are abortions, which have no operation whatever, except to bring patents in general into contempt. But all that is no great harm, unless we except the abuse of establishing a substantially good, but legally bad, patent right, into a monopoly by collusion.

What do you mean by a bad patent right?—Where a powerful infringer, by discovering some technical objection or flaw in the deeds, finds it in his power to set a meritorious patent aside; and by threatening to do so, and to go to any expense for that object, he obliges the patentee to make a compromise with him, to refuse any more licences, and repress all others who are not aware of the defect; for if the patent appears substantially good, they who are not in the secret, will be afraid of the result of an action, and still more of the expenses of the law; hence the patent can be kept up as a monopoly by terror, for the patentee is frightened into the measures of the powerful infringer, by the threat of exposing the technical defect of his right, and those measures are to frighten all others out of the new trade, by representing the patent to be good in law.

Do not you consider those small patents as capable of being protected by that sort of collusion as any others?—Yes, much more so than important ones, because individuals have less inducement to incur the expense of contesting the patents at law. Manufacturers capable of carrying on a great invention or trade, are not so easily deceived, nor would they be deterred by the expenses of law, but would certainly bring the patent right to trial, even if they did not see any technical flaw, because it

is so generally known that patents are always likely to be overturned, that it would be worth the costs of an action, to have that chance of getting over a patent for a great invention, though not for a small one.

Is not that an argument against the multiplication of patents for trifling inventions?—Yes; the evil of multiplying legal rights is always great.

Especially where they can be supported by fraud rather than by fair law?—Yes; that is the reason why I do not recommend patents to be granted cheaper, unless some other check than the cost, were applied to limit the number of them; and if it were not for the difficulty of distinguishing the merit of inventions beforehand, I should recommend a previous inquiry and selection, and the terms to be made shorter for trifling patents, and longer for more important ones, but I fear such a system would be abused. It should be observed that the collusion above described, is founded solely on the obscurity of the present law, and its technical difficulties, conjoined with the expensive nature of law proceedings on patent rights, and would not happen under a good system.

Persons take out patents occasionally, not for the purpose of using the invention themselves, but of licensing others; did you ever know where licences under a patent were publicly in the market, that a patentee refused to license a particular individual?—In practice I have known it refused at first, but afterwards granted; for a party so refused can always practise the invention without a licence, and the patentee would, I believe, get only nominal damages awarded by any jury from an infringer under such circumstances of unfair partiality in granting licences. Patents are often taken out by rival manufacturers, where there is enmity and ill-will existing between them; and sometimes the great motive of taking a patent is to steal a march upon some individual rival; but it cannot have much effect to refuse licences to such rival, for I believe that in most such cases, if a licence were refused to a party tendering such a fair price for the same, as had been accepted from others, there would be but little chance of a jury awarding real damages against such party for infringement. Even if the patent were ever so good, they would, I think, give only nominal damages in case of manifest ill-will. The costs attendant upon such verdict with nominal damages would be sufficient to suppress future infringements, if the invention were a trivial one, but not if it is an important one.

Have you known any case in which a licence under an established patent having been refused, the parties have proceeded to work?—Yes, I have known some; but I know of no instance

in which an action has been brought into court for such an infringement; for even if the patent has been established by a previous verdict, so as to leave no great chance of overturning it, the counsel for the patentee would advise him, that it was very imprudent to proceed to a trial which might set the patent aside, if it went wrong; but which was not likely to procure damages in the event of success. And in cases of a first trial, where the validity of a patent has not been established by a previous verdict, damages are not usually given, and are rarely asked for; as it is considered to be only a trial of the question of right under the patent.

Is not a licence often refused from a motive of ill-will between manufacturers?—It is so well known that the refusal would be inefficacious, that licences are not often refused now; it might be in former times; when ill-will exists, licences are very rarely asked for, so that a patentee scarcely ever gets an opportunity of refusing them. In general patentees are very eager to grant licences to any one who applies for them at any sort of fair price; because such taking of licences is an acknowledgement of their right, does credit to their patent, and induces others to apply for licences, all those motives would be strengthened if the applicant were a declared enemy.

Is it common for a patentee to license a certain number of the trade, refusing to license more?—That is seldom done, unless his patent becomes doubtful or difficult to maintain; then it is sometimes done.

In the case of the lace trade, was not there an agreement made that only a certain number of persons should be licensed? —In that case no licences were granted originally; but all the practice beyond that by the patentees, was began in infringement; and when those infringers had gone to a great length, and a large number of actions had been entered against them, and one was appointed for trial, a compromise was made, that they should all be licensed, and pay rent, for just so many machines as each had then really at work. The patentees also engaged not to grant any new licences, nor to work more than a certain extent of machinery in their own manufactures; and to prosecute all new infringers, in the most expensive manner. In that case the patentees had an interest to make that agreement and compromise with the infringers; but if they had disliked such a measure ever so much, they must have come into it, in order to avoid the risk of overturning the patent; for two defects were discovered in the specification, which, though very little known, rendered it doubtful, though not certain, whether it could be supported, if those defects had been pleaded.

The property in that patent was divided, and some of the

proprietors were much more interested in restricting the use of the patent to their own manufactories (and as few others as they could) than in licensing under the patent right; another had a larger interest in the patent right, than in any manufactory, and the premium or rent of the licences (which then amounted to 12,000*l.* a year) might have been extended so as to become more important to him, than keeping out others from the manufacture; he had therefore an interest to grant further licences, but that interest was quite over-ruled by the circumstance, that if they had granted any further licences, the whole body of infringers would not have paid any more rent, but would have continued, or renewed, their opposition to the patent, and would have allowed themselves to be brought to trial, one after another, at their common expense, which it was feared would not have failed in the end to have overset the patent.

As the doubtful point in the patent right was not at all known beyond the circle of the combination between the patentees and infringers, there was very little risk of any new infringers doing harm. The substantial merits of the patent were unquestionable, and were proved by proceedings in a trial on another subsequent patent for improvements, which patent was set aside on the ground that it was not a new invention, for that the first patentee was the real inventor, whereby he got that part of his case proved without bringing his own patent into court. The great fault in the specification which was the weak part of his case, was a clerical omission that no persons could find out, unless they went through the making of a machine exactly by the specification. All the early infringers had done so, and had thus found out how to make their peace with the patentee, but of course they kept the secret, and the later ones did not find it out, because they began to infringe, by making improved editions of the machine, and not those described in the specification.

Any persons determined to use that patent invention might, according to your former statement, have used it with impunity as there had been a determination of the patentees to withhold licences from them?—Not with impunity, because of the expenses of a verdict against them with costs; it never came to the test, but it was always my opinion that a jury would not have given real damages against any infringer who was excluded from the trade which others were permitted to practise under licence. But independently of that doubt, the costs that they would have had to pay, under a verdict with only nominal damages, was enough to deter all those who had any desire to work the patent (after the formation of the combination and limitations under licences) from attempting to infringe the patent, when it was so supported by combination and money.

It should be stated that the machines that were licensed at first, were so numerous, and they admitted of being so much improved in their productiveness without departing from the regulations of the combination, that they were made to supply the gradual increase of the market without any great call for new ones; hence those engaged in the combination were satisfied, and remained firm to it, and there was no such very great inducement for new beginners to enter into the trade, as to be worth the expense of a contest at law; and independently of expense, they would not have had much chance of overturning the patent for want of evidence against it, because all those persons were in the combination to support the patent right, who could have given evidence against it, on the omission in the specification, and on the pretext that some part of the invention as specified was not new, although it was acknowledged that the machine itself was quite new.

Was not an attempt made among the manufacturers to limit the number who should use that invention, after the expiration of the patent?—I believe there was such an attempt made, at the expiration of the first patent; the combined manufacturers were to continue to pay a reduced tax to the patentee, who was to keep up the exclusion by the threat of prosecuting new intruders under a second patent for improvements of the original machine; if that measure had succeeded it would have kept up the monopoly for four years longer; but there was such an obvious certainty that the second patent could not, by any contrivance, be brought to bear against the new beginners, that they only laughed at the threat of prosecution under it, and the attempt failed; as did also another subsequent attempt to set up a still more recent patent for improvements, which had been adopted by a part of the trade, but in such a very different mode from what was specified, that the patent could not by any construction be brought to bear against them.

Did you ever know such combinations and collusions to occur in respect to any other patent right?—I have been told that Mr. Arkwright's patents for cotton spinning were managed much in the same way, but it was long before my time; his second patent, dated 1775, was set aside for insufficiency of specification in 1785; I am not aware of the fact, whether he did employ collusion to support his patent previously or not; of course such things are generally kept secret from those not actually engaged in the business. There cannot have been many instances of supporting invalid patents by getting up sham trials between the patentee and his infringers, after a compromise; because the Judges are so acute in observing technical defects in a patent and specification, that they find them

out, even when they are not pleaded by counsel; I believe that verdicts can scarcely ever have been obtained by collusion, unless the defects of the patent have been such as would require evidence to support them, and that the parties could by collusion withhold that evidence.

Would you think it desirable that patentees who grant any licences, should be compellable to grant to the public without distinction?—That compulsion would be so difficult to apply equitably, by any plan that I have thought of, that I am inclined to the opinion that any such compulsion would be abused, and ought not to be enacted. I think it ought to be rendered as much as possible the interest of every inventor, to encourage the unlimited use of his patent, and to lead him to prefer a small tax on an extensive tradé, rather than a heavy tax on an exclusive trade, or a trade rendered unusually profitable by exclusion. The present insecurity of patent rights, and the great expense of proceedings, has a strong contrary tendency; because the more persons a patentee licenses (unless he gratifies them by making them a monopoly), the greater number of opponents he provides against himself, to set to work to discover flaws in his patent; and if a large number make a common subscription fund, for expenses, he can scarcely subdue them at law. Whereas, if fewer licences are granted, and the trade is made exclusive, they will readily pay him a high tax, and will assist him to keep up the patent, when it is used to make a monopoly, though they would do every thing they could to overturn it, if it were only used to gather a fair and moderate tax for the inventor.

How could you ascertain what would be a fair price for licence under a patent?—That might be settled by an arbitration for each individual case, but not for a whole trade, or for a long term. The difficulty is, that such fair price must vary continually with the circumstances of trade, the situation of the parties, the number of licences which are actually in exercise at the time, in competition for the supply of the market, the demand in that market, the effect of other inventions or means which spring up after a licence may have been granted, to divide the supply; in short, although the principle of arbitration would settle all these points, the expense of doing so, as often as would be required, would I think be a worse evil than the present law proceedings. It would be like attempting to provide means by law for fixing a fair rent for leasehold houses, or fixing a fair price for wages. All such laws and regulations are premiums for chicanery; knavish jobbers will study, and find out how to evade, or use them to their own purposes; but honest traders who have other occupations, cannot contend with

such men, when armed with coercive laws, and are always losers by regulations which require any thing of discretion, or attention to circumstances, in their application. It is desirable for the public good, that the extension of the practice of new inventions should be made as great as can be; but a power in the patentee to limit the exercise of the invention, is sometimes of use, to protect those who have recently embarked in the new invention, from undue competition, arising from excitement and delusion, which could not last long; his own interest, if he understands it correctly, will commonly lead him right; for it is rarely that the interest of a patentee, if he has a firm patent right, will be different from that of the public in the long run. If he has a patent that is insecure at law, it is his interest to resort to trick and fraud, collusion, combination or monopoly, to keep up his patent if he can. But after all, a patent right, which stands on its own merits, can never do the public any positive injury. The case of monopoly, such as the lace trade, (or Arkwright's), could not have been maintained as it was, if the persons who were admitted into the monopoly had not formed a very large majority of all those who had any desire or interest to practise the invention; for if the patent right had been attacked by a stronger body of new infringers, they would have overturned it, if invalid, or if it had on trial proved valid, then the patentee would have found out his own power, and that he might command his own terms, and would no longer have submitted to the combination which restrained him as well as others. Hence I conceive, that the existence of such a monopoly depends upon the circumstance, that the patent is sufficiciently exercised, to very nearly supply the existing demand for its productions. The patent might certainly do more good, if fairly worked than if abused; but it must, in my opinion, always do some good, or it will work its own cure, either by the patent being set aside, or by the patentee becoming sensible that it is worked to less than its maximum of profit to himself.

So long as the public retain free liberty to use all the means that they possessed before the patent, of doing the same thing as is to be done by the patent invention, it is not conceivable to me how they can be losers by the patent for that invention, under any circumstances whatever. If the patentee were absurd enough to lock up his patent invention altogether, the public would lose nothing that they ever possessed. Or if he over-works it, so as to ruin himself, still the public cannot be losers.

If a man is a great manufacturer himself, in the business to which his invention relates, his interest in his own manufactory may be greater than that in granting licences under his patent

to others; but it is evident that such cannot be the case unless he has the means of supplying the public demand for the new article very freely; hence they cannot lose much by the monopoly he establishes. If he permits no competition, he may keep up a high price, but if he carries that too far, he will check his own trade; for he must meet the competition of all those who practise the business in the old way, and he cannot by any means get more than a fair share of what the merit of the new invention entitles him to; the only evil is limiting the practice.

Mr. J. C. Daniell invented a new process to improve the lustre of woollen cloth, by immersing it in hot water, after the pile is set very smooth. The operation was reported to cost not more than a penny a yard; but that it increased the value of different cloths, to the amount of from two to five shillings per yard. That is to say, the same cloth would sell for so much more in the foreign, or any other market, by a penny per yard being expended upon it, in performing the new process.—He is a large manufacturer, and took a patent for the invention. That patent produced a very great revenue to the patentee, whilst his patent lasted; he received, I think at one time, a tax of 2*d*. a yard for licence under the patent; that tax was nothing, worth notice, to those who paid it, when they improved their cloths so much; but it was a greater object to the inventor than the profit that he could derive, by improving all the cloth he could possibly make in his own manufactory, and he had no interest to endeavour to make his patent a monopoly; he still retained that profit, with only a gradual diminution of it, as the practice extended over the whole trade, under the licences he granted, but as he derived a profit of two-pence per yard, (and might have had more if he had insisted on it) upon all the cloth made by others, he had the strongest interest to promote the practice to the very utmost. If he had made a monopoly, and confined the improvement to his own trade, he could not have improved the price of his own cloth more than from two to five shillings a yard, for then he came in competition with the cloth manufactured with better wool, in the old way, without his process. Now if he had attempted by exclusion to have kept that improvement of from two to five shillings a yard, undiminished by competition, during all the term of his patent, and had even doubled and trebled the extent of his manufactory (which however could not have been done all at once, and would have required a large capital), still he could not have gained anything like so much as by receiving twopence a yard on all that he could get other people to make under licence; in addition to the whole profit of the improved price of all the cloth that he could make himself; taking his

chance for the effect that a competition limited only by that tax could have, to reduce that improved price.

This case of Mr. Daniell's licences may be taken as an example, to consider what would be the result of compelling patentees to grant licences, at a price fixed by arbitration. In fairness arbitrators must in his case have awarded at least eighteen pence or two shillings per yard; when the patentee, from a consideration of his own interest, took two-pence. I am of opinion, from all the experience I have had, that such arbitrations must inevitably fix the price of licences at an average of at least four times greater, than the patentees usually fix for themselves; because if they insisted upon any such prices, it would be refused as an odious tax, which would so limit the adoption of their inventions, as to diminish the total profits of their patents. I am confident it is best to leave patentees full liberty to use their rights as they think best, and the few cases of individual exclusion that might be attempted from ill-will, would be checked by juries giving only nominal damages for infringements. Mr. Daniell's patent was set aside in 1826, under a writ of *scire facias*. A man was brought to prove he had once practised the improvement many years ago, but he did not pretend to have continued the practice, or that it was ever brought into any use. The evidence had a very suspicious air, and if true, did not in any degree prove that the invention was known or in use, to the benefit of the public; but yet it was sufficient to set the patent aside.

Are there not two objects in taking patents, one in which a man intends to keep his invention for his own use, the other in which he offers to others to use under licence?—The greater part of them sustain jointly both characters, and I think it is most desirable that every patentee should be interested in the practice of his invention for some trade of his own, as well as in licensing under the patent; because it gives him greater means of attaining perfection in the practice of the invention, and also accelerates its introduction into use. Mr. Hall, of Basford, invented a process of singing lace net, by drawing it over a flame of gas lights, and thus burning away all the superfluous fibres. I prepared a specification for his patent in 1819; he was not a lace manufacturer or dealer at that time, and he only proposed, at first, to dress the lace made by others; that was during the time that the trade was carried on under the limitation before stated. He asked a higher price for dressing lace, than the combined manufacturers chose to give him, and being united in a body they would not have adopted the new invention at all, if the patentee had not set up a warehouse in London for the sale of his improved lace, which he bought in the raw state, and refined it by his process. The superiority

was thus rendered so apparent that a great public demand for the improved lace was created; whereby the lace manufacturers, after much scrutiny of the patent, were compelled to send their goods to the patentee, who, as his trade increased, granted licences to others to dress lace. Many infringements on his patent were began, but his specification and patent proved good at law, so that he established and preserved his right.

Ought not the public, in case of the right being sold, to be enabled to come in generally?—It is very desirable that they should; and in a majority of cases it will be the interest of the patentee, if he has the power in his own hands, to get his invention into very general use; but it frequently happens, that in a trade where there are individuals of large property, to whom the expense of law proceedings is not of great consequence, they will endeavour to combine together, in order to induce the patentee by the offer of an addition to his tax for their licences (or to compel him by threatening to dispute his patent right), to limit the exercise of the patent to themselves, and debar poor men from any participation in it. I have explained before, if that the patent is at all doubtful, the patentee will be obliged to come into their measures, and then the combination may repress further infringements by the fear of the expenses of prosecutions, even where there is a probability that such prosecutions under the patent would fail.

Whom do you mean by rich men?—Manufacturers who have adopted the new invention unwillingly, because they foresee that if they do not, others, their competitors, will do so, and gain an advantage. They generally begin as infringers, but if the patent appears at all likely on the face of it to bear a trial, they combine together, either to oppose the patentee, or to take licences and combine with him, according as he either persists in granting more licences, or agrees to make a monopoly for them, whereby they become in effect joint patentees; sometimes the most powerful of such individuals pay for the licences they take, and sometimes they do not, or only a trifle, if their means of resisting the patentee and overturning the patent are strong; the less powerful ones are always made to pay.

Having stated the evil, have you any remedy to propose?—The evil arises entirely from the great expenses of law proceedings, and the uncertainty of the result.

Would you propose that it should be compulsory on parties to grant licences?—I am not prepared to say that, because, as I have before stated, that there would be so much difficulty in fixing a suitable price, and also because I think that the interests of patentees will generally be that which is desirable for

the public, and any administration of such a principle of compulsory sale would be full of difficulty. In most of the cases I have instanced, if the patent had been known to be capable of resisting all attacks at law, the patentee never would have suffered these participations in his rights, for it is always by a sacrifice of his interests, as a patentee, that the combination is formed. When a powerful infringer, who could scarcely be subdued with the present defective law, will assist the patentee, instead of opposing him, it is worth giving him a share in the patent, to bring the power he possesses to support the right, instead of destroy it. I have before stated to the Committee, that patents for inventions relating to naval or military affairs, which may be required for the King's service, often had a clause to compel the patentee to supply all that might be wanted for the King, at reasonable prices; how the price was regulated I do not know; but I once knew a patentee, during the war, who complained of injustice; he told me that after he had set up a manufactory to supply Government with the patent articles, they set up a larger manufactory of their own, with his patent machines, and all his own remained idle. There was a dispute some years ago between a patentee for barrels, for the safe keeping of gunpowder on board ships, and some officers in the dock yards, for infringement of the patent; in the proceedings before the Lord Chancellor, he declared that he should make no distinction between officers acting in the King's service, and any private individuals who might have infringed; but then, I suppose, there was no such clause in that patent.

Would not licences very often be given, though the patent is unquestionably good?—Almost invariably; the circumstances will be very peculiar when, under a patent known to be good, it will be the interest of the patentee to keep it to himself, and a few others, for their own use, rather than to have it generally practised under licences; there are some exceptions to that, but they are not very common; they are all cases in which the new invention produces a new article of commerce, and is not merely a new process for producing an old article; the consequence of this distinction is, that those who practise the patent invention have no competitors who can bring the same goods into the market, without the patent invention; hence, if the patent can be made into a close monopoly, it will command the whole supply of that market, and can consequently be made to raise the price very greatly. Such were the circumstances under which Arkwright's spinning, and the lace trade, originated. It must not be forgotten in all such cases that the inventors of entire new branches of trade, do great service to the public, even if they do charge the very utmost price for the new goods; they

cannot get more than they are worth, for no one would buy if they asked too much, and if they limit the supply, in order to make a scarcity, the public may do without the new articles as well as they did before they were invented; as I said before, the public cannot be injured in any way, though they may be more benefited one way than another; and yet I think it will be found, on consideration, that the interest of the patentee will usually be, to benefit the public as much as can be done by the new invention.

[To be continued.]

List of Patents,

Granted by the French Government between the 1st of April and 30th of June, 1830.

To Alexandre Louis Firman Boisacq and Antonio Marchand Delevingue, merchants, Lille, for an economical mode of heating steam-engines. 5 years.

— M. le Comte du Bourg, Lille, for a method of grinding all sorts of grain after the system of Councillor Mullevz, of Warsaw. 15 years.

— Josué Heilmam, merchant, Mulhausen, for a loom for weaving vertically. 10 years.

— Pierre Laborde, locksmith and mecanician, Paris, for an horizontal hydraulic engine, acting under water. 15 years.

— Adrien-Havier Martin, active partner in the beet-root sugar manufactory, at Rochincourt, in the department of the Pas de Calais, for a new method of making native raw sugar. 5 years.

— Pierre Pradel, clock-maker, Carcassonne, Aude, for a new invented wool-carder, for dressing cloth. 5 years.

— Jean Ardouin, gunsmith, of La Rochelle, for a method of charging fire arms by the breech. 5 years.

— Jacques Cail, tinman and brazier, Chaillot, near Paris, for an apparatus for distilling by steam. 5 years.

— Pierre Cartereau, brick-maker, Sarcelles, for a machine for making bricks, tiles, square tiles, &c. 15 years.

— Pierre Chouard, plaster manufacturer, Bercy, near Paris, for a permanent kiln for baking the lime previous to reducing it to plaster. 15 years.

— Aimé Duvergier and Hilarion Bordege, engineers, for an apparatus for turning water and other fluids to steam. 15 years.

To Galy Cazalat, professor of natural philosophy, Versailles, for an acrostatic lamp for lighting by means of pure water, air, and oil. 10 years.

— Garcon Malar, Paris, for a cylindrical mill. 15 years.

— Jean Gustave Grucker, bookseller, and Thiebault Antoine Schott, instrument maker, Strasbourg, for a new musical instrument, called the "Physharmonica." 5 years.

— Manteau and Deverte, Paris, mechanics, for a drawing machine. 15 years.

— Jean Louis Pichonnier, cutler, Paris, for an improved pen-cutter. 5 years.

— Perpigna, Paris, for a machine for evaporating syrups and other liquids suceptible of receiving injury from being too long exposed to the heat. 10 years.

— Quatresols de Marolles, Sepville, Provins, for a method of making bricks, tiles, and square tiles by machinery. 15 years.

— Jean-Louis Robert, Paris, for a castor or roller of a new composition, adapted to all kinds of domestic uses. 5 years.

— Pierre Augustin Santreuil, Fecamp, for various machinery, called "Machines Fecampoises," for the use of carpenters and joiners in making floors, wainscots, mouldings, cornices, window sashes, &c. 15 years.

— Pierre-Fourrier-Just Silvestre, musical instrument maker, Mirecourt, for a newly invented organ, called the "Kallistorganon." 10 years.

— Wall Stacs, secretary to the Mayor of Steenwerck, on the department du Nord, for a desk or bureau, which may be raised at pleasure. 5 years.

— Clande Chrétien and Louis Charles Sourd, silk stuff manufacturers, Lyons, for a machine for making ribbon and plain broad stuffs. 5 years.

— Jean Gustave Deleuze, jeweller, Paris, for a new invented button for fastening shirt collars, wrist bands, &c.

— Jacques-Louis Elesban-Mariton, Paris, for a sugar grater. 5 years.

— Jean François Nicolas Goulet-Collet, manufacturer, Rheims, for a new invented sounding lead. 5 years.

— Louis François Labbé, Nantes, for a machine for eradicating corns and bunnions, without the use of any cutting instrument of iron or steel. 5 years.

— Oudinot-Lutel, merchant, Paris for a horse hair stuff for making dresses, &c. 10 years.

— Pelletan, professor of natural philosophy, Paris, for a system of steam navigation, by machinery, the whole of which is below the surface of the water. 15 years.

To Louis Auguste Richard, Saint Chamond, for the invention of "Vocotypographic," or the art of printing by the means of 40 moveable characters, with their appurtenances, &c. 5 years.

— Benoit Roca, Montferrer, for a plough. 5 years.

— Nicolas-Joseph Schwabel, mechanic, Strasbourg, for a machine for cutting up raw tallow. 5 years.

— Pierre François Toussaint, locksmith and mechanic, Paris, for a lock called the "Dimochline." 5 years.

— Tardy, father and son, merchants, Valencia, for a spinning machine, called the "filière unique." 5 years.

— Charles Benjamin Tienard and Adrien-Jean Baptiste Matthie, Paris, for a new invented patten or clog, with a slide. 5 years.

— Aloese Weinling, Gustave-Adolphe Marin, Jean Frédéric Schmidt and Ignace-Gall Fritsch, Paris, for certain improvements in terrestrial and celestial globes

— Pierre David, mecanician, Lyon, for an improved silk winder. 10 years.

— De Courtois-Duvallier, Paris, for a powder horn with a double charge, at different degrees. 15 years.

— Sebastien Erard, musical instrument maker, Paris, for a sounding board with valves, applicable to the organ, for increasing or diminishing the tone by the fingering only. 15 years.

— Edourd Hall, engineer, Paris, for a water mill applicable to waterfalls of different levels. 15 years.

— Jean Lambert Goulbièr, lamp manufacturer, Strasbourg, for a new lamp socket. 10 years.

— Michel Grand, mecanician, Marseilles, for a lever, which he has called the "balancoir moteur a la grand." 15 years.

— Guillaume Antoine Guérin, boot maker, Paris, for waterproof boots and shoes, called "antisoque." 5 years.

— Jean Thomas Hutter, master of the glass works at Rive de Gier, Lyons, for a mechanical revolving kiln for preparing window glass. 5 years.

— Claude Jaillet, junior, pattern drawer, Lyons, for a machine for making all kinds of figured stuffs. 15 years.

— Joseph Jaud, mecanician, Lyon, for a machine for winding silk, wool, cotton, &c. 5 years.

— Antoine Jourdan, Paris, for a perpetual kiln for preparing limestone, plaster, &c. &c. 10 years.

— Jean Baptiste Pirodon, wax and tallow chandler, Grenoble, for a method of making mould candles with two wicks.

— Louis Roth, Paris, for an apparatus for evaporating syrups, &c. without diminishing the quality. 15 years.

To Louis Charles Sterlin, ironmonger, Paris, for a new lock. 10 years.

— John Meadows White, London, for a combination of machinery or locomotive force, adapted to carriages and boats, &c. or which may be applied to engines of all descriptions. 15 years.

— Jean Joseph Nicolas, tanner, Paris, for a method of tanning rabbit skins. 10 years.

— Louis Benjamin Mazoyer Lagrange, merchant, Marseilles, for a process for clarifying liquids. 10 years.

— Denis Aguado Guitarist, Paris, for an apparatus for holding the guitar. 5 years.

— Constance Best, Paris, for a water mill or hydraulic machine. 15 years.

— Ives Andrè Bingant, working jeweller, Paris, for a metal comb, in one piece. 5 years.

— Antoine Corrège, mecanician, for a kneading machine. 5 years.

— Jean Guillaume Duhamel, manufacturer, Darnetal, for an apparatus, combining economy of fuel adapted to various purposes.

— Piérre Erard, piano forte manufacturer, Paris, for sundry improvements. 10 years.

— Escarmella, chocolate maker, Paris, for a newly invented chocolate, called "Theobrama ou Mets des Dieux." 5 years.

— Pierre Ferrand, Paris, for a mechanical kneading machine. 5 years.

— Jacques Dominique Charles Gavard, Paris, for an apparatus for drawing, by a continual movement, without any knowledge of the art. 10 years.

— Pierre Noël Gérard au Mans, Sarthe, for improvements in tempering steel for making tools, &c. 5 years.

— Félix Haize, engineer, Paris, for a new kneading machine. 5 years.

— André Kæchlin and Co., manufacturers, Mulhausen, for a new invented loom, producing three movements. 10 years.

— Jean Auguste Philibert Alexandre Lacordaire, government engineer, Dijon, for a new system of rail roads. 10 years.

— Amand Mare, laceman, Paris, for a new child's pad, called "bourrelets hygiéniques." 5 years.

— Henri-Etienne Moiselet, mechanic, Lyons, for a machine for making hooks and eyes. 15 years.

— Castero, Paris, for a sub-marine apparatus for saving lives and property in cases of shipwreck, &c. 5 years.

To Salomon, musical professor, Paris, for an instrument for tuning, called the "accordeur." 5 years.

— Marie François Flechel and Jean Baptiste Joseph Deharbes, Paris, for a kiln for preparing turf. 5 years.

— Henri-Auguste Barbet, Brothers and Co., manufacturers, Rouen, for a winding machine, which stops of its own accord when a thread is broken. 10 years.

— Louis Cresson d'Orval, Paris, surgeon-midwife, for unirary probes and other improvements of caoutchouc. 5 years.

— Louis Nicolas de Bergue, mecanician, Paris, for an improved loom. 15 years.

— François Gueroult, Paris, for an improved process in making bricks, tiles, and architectural ornaments. 5 years.

— Jean-Julien Josselin, laceman, Paris, for certain improvements in ladies' stays. 5 years.

— Louis Florimond Miné, tinman, Paris, for improvements in the transport of night stools, &c. 5 years.

— René Monet, Paris, for an apparatus for making coke, and other improvements. 15 years.

— Charles Pocquel, Paris, for a new vapour bath, called "bains russes perfectionnés." 10 years.

— Hyppolite Royet and Co., ribbon manufacturers, Saint-Etienne, for the manufacture of ribbon of various colours. 5 years.

— Nicolas Wolf, Rottan, department des Vosges, for improvements in making charcoal. 5 years.

— Charles Ducret, junior, and Regnier, clock makers, Besançon, for a new invented timepiece. 5 years.

— Armand Nicolas Frèche, artist, Toulouse, for a mechanical flail. 15 years.

— Hérisson, M.D. and Garnier, watchmaker, Paris, for an instrument for telling the variation of the pulse, called the pulsomètre. 10 years.

— Theodore Jones, London, for improvements in carriage wheels. 15 years.

— Lèpine, Paris, for a portable apparatus for lighting apartments, manufactories, &c. by means of hydrogen gas and ordinary heat. 10 years

— Henry Cruger and Charles Fox Price, Bristol, for an apparatus for warming apartments, or an improved stove. 15 years.

— Mme. Rondet néc Marie Louise Chéon, Paris, for an improved surgical instrument, called the pessaire. 5 years.

— Frdéric Soutzner, Paris, for a process for making the powder called "fleur de café." 5 years.

To Jean Stolle, colour and white lead manufacturer, Strasbourg, for machines, &c. for making nails, &c. 5 years.

— Henri Zilges, Paris, for a bridle for runaway horses, called bride d'airet. 10 years.

— Raffin and Vallon, cutlers, Paris, for a new invented grafting knife for general use. 5 years.

— Quartresols de Marolles, Versailles, for a mechanical flail. 5 years.

— Jean-Louis-Laurent Boudier, wheelwright, Passy, for a cart adapted to two or four wheels, by means of moveable axletrees, called the "chariot boudier." 5 years.

— Nicolas Sulot, music master, Dijon, for improvements in the science of music. 15 years.

— Auband Lamure Isère, for an economical oven for baking bread. 15 years.

— John Beare, London, for certain improvements in pumps. 10 years.

— Louis Jean Baptiste Bizet, tinman, Paris, for improvements in shower baths. 5 years.

— Isidore Delhomme and François Parabére, for a power machine. 15 years.

— Jean François Godin, manufacturer, Petit Bagneux, Seine, for a steel-yard for weighing carriages, called the "métrobare." 10 years.

— Thomas Oxnard, merchant, Marseilles, for improvements in refining sugar, 15 years.

— Antoine-Remi Polonceau, engineer, Paris, for a system of bridges. 15 years.

— Pierre Louis Richou, Rouen, for improvements in carriages adapted for travelling. 10 years.

— James Viney, London, for improvements in the generating of steam, adapted to various purposes. 15 years.

— Louis Alexandre Buisson, glover, for improvements in skins intended for gloves, and for the invention of gloves called "gants denois and gants de Suisse." 10 years.

— Casalis and Cordier, mecanicians, St. Quentin, Aisne, for certain improvements in calendering cloth. 5 years.

— Jean Louis Fanon, packing case maker, for a peg for packing ladies' bonnets with safety, called the "champignon mécanique." 5 years.

— Jean Louis Pichonnier, cutler, Paris, additional patent for a new pen cutter. 5 years.

— Antoine Léandre Sardou, professor of geography, Paris, for a new system of maps used in teaching, and which he calls "mégalomappes." 5 years.

To Louis Serbat, chemist, Paris, for a process of decolorating sugar. 15 years.
— François Charles-Barthélemi de Souchon de Loubières, Paris, for a circular planisphere, applicable to clock-making and other purposes. 10 years.
— Hubert Chambry, hatmaker, Paris, for improvements in hatmaking. 10 years.
— Félix Cochaux, engineer, Liege, for a system of wheels adapted to steam carriages. 15 years.
— George Dauré, London, for improvements in distilling and extracting the gas, &c. from animal and other substances. 15 years.
— Etienne Jean Baptiste Gagneau, lamp manufacturer, Paris, for an improved lamp, called the "lampe aglatique." 10 years.
— Bonaventure Grillet and Antoine Blein, silk stuff manufacturers, Lyons, for a machine to prevent dyers from pilfering the silk entrusted to them. 5 years.
— Pauwels, Son, manufacturer, Paris, for improvements in steam navigation. 15 years.
— Antoine Dominique Sisco, locksmith, Paris, for an instrument for taking fire arms to pieces, and vice versa, called the "monte ressort boîte." 5 years.
— Nérée Tellier, goldsmith, for a new axletree, called "essieu tellièr." 10 years
— Arlès and Delolme, merchants, Paris, for improvements in casting iron. 10 years.
— Jean Baptiste David, mechanic, Paris, for a mechanical kneading machine. 10 years.
— Charles Pierre Gourlier, architect, Paris, for a new mode of constructing tubes for chimneys, &c. 15 years.
— Joseph Eloi Xavier Jullien, printer, Montpellier, for a pedal movement. 10 years.
— Pelletan, Dr., physician to the king, for improvements in steam navigation, the machinery being made to act below the level of the water only. 15 years.
— Thomas Revillan, clockmaker, Mâcon, for a machine for receiving the pressure of fluids, &c. and converting it into a moving force. 15 years.
— Calas and Butler, Paris, for improvements in making stuffs by means of an instrument called "temple or tempia." 5 years.
— Nicolas Houzeau Muiron, manufacturer, Rheims, for an economical method of making and printing waterproof stuffs. 5 years.

To Alexandre and Zacharie, feather makers, for a stuff made of feathers. 5 years.
— Pierre Clament Zuntz, Paris, for a method of making verdigrise. 5 years.
— Louis Brunier, architect, Paris, for an hydraulic machine, called the "hydromoteur-conterm." 15 years.

New Patents Sealed.

To William Mason, of Margaret Street, Cavendish Square, in the county of Middlesex, axle tree maker, for his having found out and invented certain improvements on axle trees, and also the boxes applicable thereto. —Sealed 24th Aug. 6 months.

To Thomas Barratt, of Saint Mary Cray, in the county of Kent, paper maker, for his having invented certain improvements on machinery for making paper.—31st Aug. 6 months.

To Augustus Applegarth, of Crayford, in the county of Kent, printer, for his having invented certain improvements in printing machines.—31st Aug. 6 months.

To William Losh, of Benton House, in the county of Northumberland, Esq. for his having invented certain improvements in the construction of wheels for carriages to be used on railways.—31st Aug. 6 months.

To Edwin Budding, of the Thrupp, in the parish of Stroud, in the county of Gloucester, machinist, for his having invented a new combination and application of machinery for the purpose of cropping or shearing the vegetable surface of lawns, grass plats of pleasure grounds, constituting a machine which may be used with

advantage, instead of a scythe for that purpose.—31st August. 2 months.

To John Hanson, of Huddersfield, in the county of York, plumber and brazier, for his having invented certain improvements on locomotive carriages.—31st August. 6 months.

To Edwin Clayton, of Briddlesmitle Gate, in the town and county of the town of Notingham, baker, for his having invented an improved mode of manufacturing dough or paste, for the purpose of baking into bread. 31st Aug. 6 months.

To Thomas Thacher, of the parish of Birmingham, in the county of Warwick, saddler, for his having invented or found out an elastic self-adapting saddle.—7th Sept. 6 months.

To Peter Williams, of Holywell, in the county of Flint, surgeon, for his having invented an apparatus or contrivance for preventing accidents in carriages, gigs, and other vehicles, by instantly and effectually liberating horses or other animals from the same, when in danger or otherwise, and for locking and securing the wheels thereof, in cases of danger, emergency, or otherwise.—7th Sept. 6 months.

To Charles Blacker Vignoles, of Furnival's Inn, London, and John Ericsson, of Brook-street, Fitzroy-square, in the county of Middlesex, civil engineer, for their having invented certain additions to the engines commonly called locomotive engines.—7th Sept. 6 months.

To William Cook, of Redcross-square, Cripplegate, in the city of London, fine-worker, for his having invented certain improvements on cocks for supplying kitchen ranges or cooking apparatus with water, and for other purposes, to be called fountain cocks.—7th Sept. 6 months.

To Henry George Pearce, of Liverpool, in the county of Lancaster, master mariner,—Richard Gardner and Joseph Gardner, of the same place, merchants, for their having invented an improved fid.—7th Sept. 6 months.

To James Chadley, of Gloucester-street, Queen-square, surveyor, for his having invented certain improvements in making or forming bricks, tiles and chimney bars, applicable to building or erecting the flues of chimnies.—13th Sept. 6 months.

To Seth Smith, of Wilton Crescent, in the parish of St. George Hanover-square, in the county of Middlesex, builder, for his having found out and invented certain improvements in chimnies for dwelling and other houses and buildings.—14th Sept. 2 months.

To Francis Molyneux, of Hampstead, in the county of Middlesex, gentleman, and William Bundy, of Kentish Town, in the same county, mechanist, for their invention of certain improvements in machinery for spinning and twisting silk and wool, and for roving, spinning, and twisting cotton, flax, hemp and other fibrous substances.—21st Sept. 6 months.

To William Church, of Heywood House, Bordsley Green, in the county of Warwick, gentleman, for his invention of certain improvements in the construction of boats and other vessels, a part of which improvements are applicable to the construction of carriages.—21st Sept. 6 months.

CELESTIAL PHENOMENA, FOR OCTOBER, 1830.

D.	H.	M.	S.	
1	19	57	0	Ecliptic opposition or ○ full moon.
2	20	0	0	☾ in conj. with ν in Pisces
3	22	0	0	☾ in conj. with μ in Ceti
4	16	0	0	☾ in conj. with f in Taurus
5	0	0	0	☉ before the Clock 11 *m.* 28 Sec.
5	12	0	0	☾ in conj. with γ in Taurus
5	13	0	0	☾ in conj. with 1 δ in Taurus
5	13	0	0	☾ in conj. with 2 δ in Taurus
5	18	0	0	☾ in conj. with α in Taurus
6	0	0	0	☾ and Aldebaran an occultation.
6	8	0	0	♀ in conj. with β in Virgo
8	10	32	0	☾ in ▭ last quarter
10	0	0	0	☉ before the Clock 12 *m.* 52 Sec.
10	1	0	0	☿ in conj. with ι in Virgo
10	10	0	0	☿ in conj. with α in Virgo
10	21	0	0	♃ in conj. with 1 ν in Satt.
12	7	0	0	☾ in conj. with ρ in Leo
12	20	0	0	♀ in conj. with ν in Virgo
13	7	0	0	☾ in conj. with σ in Leo
13	22	0	0	☾ in conj. with β in Virgo
14	14	0	0	☾ in conj. with η in Virgo
15	0	0	0	☉ before the Clock 14 *m.* 4 Sec.
15	1	0	0	☾ in conj. with 1 γ in Virgo
15	0	0	0	☾ and ♀ an occultation Immersion 3 h. 0 *m.* 15 s. Emersion 5 h. 43 *m.* 18 s.
16	0	0	0	♅ Stationary
16	7	31	0	Eclip. conj. or ● new moon
17	12	0	0	♀ in conj. with 1 ν in Virgo
18	20	0	0	☽ in conj. with υ in Libra
19	0	0	0	♂ Stationary
19	7	0	0	☽ in conj. with ψ in Libra
19	23	0	0	☽ in conj. with φ in Oph
20	0	0	0	☉ before the Clock 15 *m.* 3 Sec.
20	21	0	0	☿ in conj. with ♀ Long. 11° in Virgo ☿ lat. 47' N. ♀ lat. 1° 29' N. diff. of lat. 42'.
21	0	0	0	♀ Stationary
23	6	0	0	☽ in conj. with *d* in Sagitt
23	10	7	0	☉ enters Scorpio
28	17	0	0	♀ in conj. with ϑ in Virgo
24	10	20	0	☽ in □ first quarter
25	0	0	0	☉ before the Clock 15 *m.* 45 Sec.
27	7	0	0	☽ in conj. with λ in Aquarius
27	16	0	0	☽ in conj. with φ in Aquarius
27	18	0	0	♀ in conj. with ϑ in Virgo
28	4	0	0	☽ in conj. with ♂ long. 21° in Aquarius ☽ lat. 1° 9' S. ♂ lat. 2° 21' S. diff. of lat. 1° 12'
29	10	0	0	♃ in conj. with ο in Sagitt
30	0	0	0	☉ before the Clock 16 *m.* 10 Sec.
30	7	0	0	☽ in conj. with ν in Pisces.
31	5	18	0	Ecliptic oppo. or ○ full moon
31	9	0	0	☾ in conj. with μ in Ceti

The waxing moon ☽.—the waning moon ☾

METEOROLOGICAL JOURNAL, FOR AUGUST AND SEPT. 1830.

1830.	Them.		Barometer.		Rain in inches.	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
Aug.											
26	66	49	29,76	stat.	0,75	11	61	39	29,66	stat.	,05
27	65	51	29,76	29,50		12	58	45	29,86	29,31	,15
28	61	50	29,51	29,36	,4	13	62	39	29,50	29,40	,1
29	64	46	29,99	29,83	,125	14	64	41	29,45	29,36	,025
30	65	38	30,11	stat.	,05	15	64	41	29,66	29,55	
31	67	36	30,16	stat.		16	63	52	29,70	29,50	,15
Sept.											
1	69	46	30,23	stat.		17	58	41	29,66	29,57	,273
2	69	41	30,14	29,94		18	63	43	29,80	29,53	,05
3	65	50	29,79	29,76	,025	19	62	38	29,86	29,69	
4	68	51	29,85	stat.		20	59	46	29,55	29,52	,1
5	64	48	29,66	29,65	,125	21	54	47	29,29	29,22	,4
6	59	50	29,58	29,46		22	59	34	29,66	29,40	,1
7	62	50	29,74	29,64	,375	23	62	44	29,56	29,31	,325
8	62	50	29,95	29,88	,075	24	61	43	29,64	29,53	,025
9	58	39	29,83	29,63		25	57	43	29,84	29,61	,1
10	62	49	29,65	29,59	,275						

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXII.

[SECOND SERIES.]

Original Communications.

Art. I.—On Shalder's Patent Fountain Pump.*

To the Editors of the London Journal of Arts, &c.

Gentlemen,—Of all machinery adapted to the general uses of life, none is so universal, and none more important than that which is constructed for the purpose of raising water from one situation to another. It therefore follows that any improvement by which this object may be effected with greater facility, convenience and dispatch,

* *Note.*—In Vol. XII, of our First Series, page 9 and Plate I, a description of Mr. Shalder's invention is given, which he there denominates a gravitating and expressing fountain. The essential part of the invention has now assumed a somewhat different appearance, and being practically applied with considerable advantage to pumps, we are persuaded that the following communication will be acceptable to our readers.—Editor.

becomes of the highest value to the world, and as far as regards mechanical invention, is of greater consequence in this than in any other species of machinery.

To prove this assertion, it would only be necessary to point out the numerous attempts which have been made to accomplish this desirable end. It has been the research of learned and scientific men; but many centuries have elapsed, and we have still found the same mode handed down to us, with all its acknowledged imperfections. In the invention which I am about to introduce to the reader's notice, every former deficiency is remedied, and the object required is produced by the most direct and satisfactory means, leaving no desideratum; and there is no doubt, from the strong testimonials of its efficacy, that in the course of a short time this invention will wholly supersede every other method at present in use.

When the principle of this fountain pump is thoroughly understood, its advantages are sufficiently obvious, and to those who do not comprehend its construction, or are at a loss to perceive its peculiar mode of action, I need only refer to the numerous demonstrations of its superiority. These facts decide at once in its favour.

I am now only speaking of its comparative working properties, and increased power in raising water; but when to these it is added that the fountain pump is more durable, more economical, and more simple in its construction, there can be no hesitation in yielding to it the most decided preference, whether applied to the arts, navigation, or domestic purposes.

In the common pump, when properly made, the piston should fit the inside of the working barrel so closely as to form a perfect vacuum, that the leather or packing may press hard against the sides of the cylinder; this consequently produces, when the pump is in action, an

irregular, unsteady resistance, while independently of the unnecessary waste of power to counteract friction, produces an uneasy stiffness in motion, which soon wearies the performer. By the advantages possessed in the invention under consideration, no friction occurs, and these defects are wholly obviated.

With the common pump, solid substances as hard pieces of wood, particles of sand, &c. &c. are very apt to insinuate themselves between the bucket and the barrel; these may either unpack the piston, or by grinding and tearing the leather, or forming grooves in the barrel, render it totally unserviceable, until it again passes through the hands of the maker. In this improvement the connecter is so constructed as to cast up and deliver solid substances with as great facility as it does the fluid, and without the possibility of injury or derangement to the workmanship.

In the pump constructed upon the new principle, the bucket is surrounded by a strong pliable leather tube, which I call the connecter, of a conical figure, or the diameter of one end is rather less than that of the other; this is supported by the expresser or bucket when in movement, and easily admits of being inverted and retroverted. Its lesser circumference is closely secured to the upper and outer extremity of the expresser; and the larger circumference is fastened to the inner part of the cylinder between two flanges. This effectually precludes the possibility of leakage, as the connection is completely cut off between the upper and lower portion of the barrel, except through the valve of the bucket. Thus we have the three grand defects of the common pump, from friction, choking and leakage entirely remedied besides, as before stated, less original expense, less wear and tear, and greater simplicity.

The operation of the pump on the improved plan may be compared to the action of lifting through the air a bucket of water, suspended to the counter end of a lever or pump handle. Supposing the bucket at each depression of the handle to empty itself, and to refil at each elevation, we have a representation of its mode of action, there being neither more or less friction in resistance in the one instance than the other. There is only the weight of the water to contend with, and so ample is the power gained by the adaptation of the new principle, that double the work may be accomplished in a given time, in other words, that one man may perform the work of two; or what would occupy a man two days to complete, may be finished in one day.

The following is a description of this invention given by a scientific gentleman of acknowledged talent:—" This improvement is designed to avoid the friction of an ordinary pump, by substituting in place of the usual air and water tight packing of the piston or bucket, a flexible tube or diaphragm surrounding the bucket, which rises and falls with it. Plate III, fig. 1, represents the bucket with its diaphragm and other appendages detached from the pump and shewn in perspective. Fig. 2, is a geometrical section of the same taken through the middle perpendicularly; and fig. 3, is a plan or horizontal view of the same, as it would appear when seen from above. In all which figures similar letters refer to corresponding parts; *a, a,* is the bucket or piston of the pump, having two valves *b, b,* opening upwards as usual; *c, c,* are bent arms, for the purpose of attaching the bucket to the pump rod at *d,* by which the bucket is to be raised and lowered in the pump barrel, by means of the pump handle, or by any other common contrivance.

" The diaphragm *e, e,* is a tube of leather or other suitable

flexible material, which is air and water tight. It is made from a disc of leather, rather larger in diameter than the interior of the pump barrel, in the centre of which a circular hole is to be cut, rather smaller than the interior of the bucket, which gives it the form of a broad ring; this ring of leather is then soaked and pressed upon a block until it is brought into the form of a frustrum of a cone, very much resembling in shape a round hat, with the centre of the crown removed; the frustrum having a narrow rim at bottom on the outside, and a similar rim at top on the inside, which two rims are for the purpose of attaching the diaphragm to the pump barrel, and to the bucket.

"To the lower part of the bucket a cylindrical or bell-formed tube *f*, is attached, for the purpose of preventing the diaphragm from collapsing under the bucket when the pump is in action. At the lower part of the bucket there is an internal flange *g*, *g*, and a corresponding flange, *h*, *h*, at the upper part of the bell-formed tube, which two flanges take hold and confine the inner rim of the diaphragm, and are held together by screws, bolts, and nuts, as seen in fig. 2. The outer rim of the diaphragm is in a similar way held securely between flanges in the pump barrel, and by these means the upper and lower parts of the pump barrel are separated, and an air and water tight partition formed, without packing the bucket as in ordinary pumps.

"It will now be seen that on the ascent or descent of the bucket, the diaphragm being flexible, will readily rise and fall, leaving the water way clear and effecting all the purposes of a tight bucket or piston, without producing any of the friction which results from the employment of a bucket fitted closely to the barrel, as in pumps of the usual construction."

Experiments have been frequently made with this improved pump, by introducing sand, fragments of wood, gravel, apples, &c. &c. yet any substance capable of passing the valves has been ejected along with the water, without the least impediment or detriment. There is likewise a large body of evidence from practical manufacturers, who have made use of the fountain pump for different purposes, for various periods, from one to four years; these distinctly assert its manifest superiority, and amply confirm the character just given of it.

The patent pump is confidently recommended to engineers, as being the most efficient machine to remove or supply large bodies of water. By the aid of the steam engine its operations would be prodigious, while the saving of fuel and attendance would reduce the expenses by one half. To water companies it will shortly become an essential auxiliary, and it will be the duty of those who have the public trust reposed in them to employ it. The same observations will apply to mining operations, either to those conducted by public associations, or by private individuals; with them it is indispensible, as it is the only machine not liable to embarassment by the presence of sand, gravel, &c. &c. It is well known that many mines, after much delay and expense, have been abandoned from this very cause.

To road surveyors its utility is conspicuously pointed out; in watering the roads, dispatch is requisite, as the watering ought to be finished in the early part of the day; double the number of carts may be engaged at once, and the whole be completed in one quarter the time, and at half the expense.

To breweries it will become a necessary appendage, as it may be easily removed from one place to another; the work will be concluded in one half the time, or boys

may be substituted for men, which in the course of a year, will produce a material saving. The same remarks are applicable to tanneries, to pump the water and ouze; in distilleries, the wash and spirit; and in dye houses, the dye, &c.; for these purposes the pumps may be constructed of wood, &c. at a very trifling prime cost. For brickmakers, excavators, &c. it is the only pump suitable to their purposes.

The utility of the pump is so general, that it may be said that no establishment of any description is complete unless so provided; in the house, in the garden, in the stable yard, pumps on this improved principle are most particularly adapted, as children or females can work them with the greatest ease, and when out of order, though seldom, they may be repaired without the aid and expense of a plumber.

For the purposes of agriculture in dry seasons, they may be employed on an extensive scale to irrigate the land, as the labour of supplying water is so materially diminished; and when used for the purpose of drainage, large tracts of land may be brought into cultivation.

In nursery grounds and large gardens, where diffusion of water is so essential, they will become a valuable acquisition.

In our West India posessions, and other colonies, where large supplies of water are required for cattle, and numerous other services, the fountain pump will become a necessary apparatus; those they have in use at the present time are, generally speaking, extremely defective; this circumstance arises from the common pump being so soon out of order, from its defect in principle, and from being little understood, except by workmen, who most usually reside at a distance.

Proprietors of estates are therefore particularly en-

joined to direct their attention to this object, as they can always have the independent means of possessing a superior and more powerful machine, easily repaired, and attended with infinitely less expense. Those who desire to have the ordinary friction pump process replaced by one on the new plan, have no necessity to alter the former arrangement of pipes, machinery, &c.; it would only be requisite to supply a new cylinder and expresser. The principle of the improvement can also be applied to the forcing pump, where it still preserves its extraordinary advantages. For fire-engines, deep wells, and to supply elevated situations, it is admirably calculated. In short, to those who are zealous in real improvement, or have economy in view, the fountain pump is earnestly recommended as a machine whereby much time and outlay will be ultimately saved; in every instance where a pump is required, it is infinitely superior, and in some instances it will not admit of substitution.

I am, Gentlemen, yours, &c.
JOHN ELLIOTT,
Civil Engineer.

Commercial Road.

ART. II.—ON NICHOLLS' POWER LEVER.

THE following paper referring to Nicholls' Patent for improvements in the application of the lever (or rather pendulum) to generate power, is forwarded to us by a correspondent. We have no doubt but that the inventor is labouring under an error, but we do not feel justified in suppressing facts which appear to be sanctioned and supported by respectable authority. The Specification of this invention will be found in Vol. IV. of our present Series, page 35 and Plate III.

To the Editors of the London Journal of Arts, &c.

GENTLEMEN,—Herewith you will receive a statement of a series of trials made with a view to determine the power of "*Nicholls' Improved Lever.*" If you should consider this detail of particulars sufficiently interesting, you will perhaps find room for their insertion in your ensuing Journal. The ingenious inventor will be obliged by the opinions of your intelligent correspondents on the merits of his invention.

Plate III, fig. 4, is a rude sketch of the apparatus now stationed at the Regent's Canal Basin, near Battle Bridge, St. Pancras, and which is open to the inspection of scientific gentlemen who may wish to investigate the principle of the invention.

A straight beam of wood, *a, a, a,* having a piece fixed to it, in the centre at right angles, is made to vibrate on an axle or pivots at *b,* supported by framings not shown. The extremities of the beams are weighted by cast iron discs or plates, attached to it, and the whole is strengthened by rods which tie the ends of the beams to the central piece; *d, d,* are two arms extending from the central piece, and vibrating with the beam, to which pump rods *e, e,* are connected by joints; *f,* represents one of the pumps fixed to the floor below, to which *g,* is its suction pipe, and *h,* the pipe for the ascending column. The top of the pipe *h,* is closed by a valve *i,* which valve is loaded with a weighted lever *k,* the weight *l,* being adjustable upon the lever, in order to give any required pressure, and thereby ascertain the power exerted by the pump. The actuating power being applied at the end of the lever by an arm and rope *m,* or otherwise, the beam is made to vibrate, and the water lifted by the force of the pump, on being discharged through the valve at top, flows into a wooden shute, represented by dots, and from thence is emptied by a pipe into a tub below, or flows away.

REPORT

Of a series of experiments made with a view to determine the power of the "Improved Lever."

The lever was of the principle described in the Specification and drawings, but applied to pump water only, constructed of deal timber, and weighted by plates of cast iron attached to each end. In dimensions the lever was eleven feet from the fulcrum or axis on which it moved to the centre of the weighted discs or plates, and the line of the centre of the weighted plates three feet below the axis of motion, the weighted plates being braced to the top of the centre part two feet four inches above the axis of motion, as in the figure.

The working barrel of the pump attached to one of the double arms by a connecting rod, was nine inches diameter, and admitted of a twenty-inch stroke. The suction and upright pipe five inches diameter. The height from the water to the working barrel two feet. The barrel two feet, and the upright pipe nine feet, making together thirteen feet from the surface of the water to the point of delivery.

Two men working the lever by a jerk or pull, made eleven strokes, of eighteen inches each in one minute, raising four gallons at each stroke. A valve tightly fitted to the top of the upright pipe, was weighted by a graduated lever, and with 200 pounds pressing on the valve, two men were able to make twelve strokes, of sixteen inches each, in one minute.

The facts here stated are not perhaps of so decided a character as might have been wished, yet enough has been done to shew that the vibration of suspended weights may probably be applied with advantageous effect, under given circumstances, but how far they originate a power that can be generally applied as a first mover, experience alone will determine.

The men employed in the four first experiments were a

millwright, a moderate sized man about eleven stone, and a youth of sixteen, about nine stone. The other experiments were made by a labourer, of short stature and ordinary muscular formation, about ten stone and a half, and the same youth as in the former experiments. See the detail of experiments in the following Table:—

Tabular Results of Experiments, &c.

Date of Experiments on the Power Lever	Length of the stroke in inches.	Number of strokes per minute.	Weight of water raised in lbs. in 1 minute.	Weight put on the valve.	Total weight moved at 13 feet high.	Effect in feet equal to the Alt. of a 5-in. coln.	Quantity of water rais'd in gallons.	Men employed to work the lever.
1830:								
July 26th - -	18	11	455	000	455	13	45	2*
Ditto - -	16	12	432	224	656	36	43	2
—— 29th - -	14½	11	364	224	588	36	36	2
Ditto - -	14	13	392	000	392	13	39	1†
August 2d - -	12	12	310	168	478	29	31	2‡
Ditto - -	9	12	248	224	472	36	24.8	2‡
Ditto - -	8½	12	233	280	515	42	23.5	2‡
Ditto - -	7½	12	207	392	599	56	20.7	2‡
Ditto - -	8½	13	221	336	577	49	22.	2‡
Ditto - -	6½	12	179	448	627	62	18.	2
Ditto - -	6½	11	164	560	720	75	16.4	2
August 3d - -	7½	11	187	448	635	62	18.7	2
Ditto - -	6¾	11½	166	560	726	75	16.6	2
Ditto - -	4½	12	136	840	976	108	13.6	2

* In this experiment the lever was worked but with little exertion.

† The water collected in this experiment was thirty-six gallons, besides the waste.

‡ In these experiments the working was performed by an ordinary labourer, and a youth, without much difficulty.

In the latter trials the suspended weights were increased from 8½ cwt. to 13½ cwt. at each end of the lever; the effect appeared to be a somewhat shorter stroke, the lever moving through less space, and requiring additional steady force to effect a regular pumping motion; the lever however appeared to increase in its power by additional weight.

In these calculations the weight on the valve of the pump of the unbalanced column of water is uniformly taken at eighty-five pounds. The weight of water at each inch of lifting is taken at two 3-10 pounds, and the power of a man, six cubic feet of water raised ten feet high per minute.

Comparing the water collected and measured with calculation, it appeared that the latter exceeds the former by about one-thirteenth part, and this difference appeared to be uniform in several trials.

To establish the fact of a man raising a given quantity of water per minute, a handle or lever ten feet long was attached to the same pump, under very favourable circumstances for working, and by great exertion a man raised six cubic feet, thirteen feet high, per minute by calculation; this however, was a labour he could not continue for more than a few minutes; he appeared to very much prefer working by the jerk or pull, as applied to Mr. Nicholls' machine. The valve was then weighted with 224 pounds, and the same two men were unable to pump at all with effect by the handle or lever, the force required being beyond their strength. This trial may be compared with Nos. 2, 3, and 6, in the table, made with the lever. At thirteen feet high the common pump exceeded the machine in effect, but under heavy pressures the machine appeared to greatly exceed the force of man, applied by ordinary means.

Some variety appears in the results which cannot,

perhaps, be satisfactorily explained. The friction in the machine might be variable, or the physical exertions of the men working the machinery, may have been greater at one time than another. I am inclined to refer a good deal to the latter cause—want of experience, however, may account for some part of the irregularity; an exact alternate operation as to time is required, for if the lever has not its regular sway, or is checked by an untimely application of force, the effect of the suspended weights is counteracted, and the force of the man exerted on the machine, without a correspondent effect.

The experiments made Aug. 2d and 3d, were made with a bar of iron attached to one end of the lever seven or eight feet in length, but this addition of leverage did not appear to add much to its power, or to materially decrease the speed of the vibrating weights. At the end of the extended bar, a man can only exert his force through a short space, and that the effect of a dead weight is superior to a jerk or pull, was in one case proved by a man walking on the top of the beam.

Those conversant with these subjects will at once perceive the difference between the balanced lever and the arrangement suggested by Mr. Nicholls. The balanced lever being uniformly in a state of equilibrium, but Mr. Nicholls' lever is only in equilibrium in one particular position, and that equilibrium being disturbed by a convenient force, the question to be resolved in this case is—*Do the suspended weights, in their efforts or disposition to regain an equilibrious state, exert a force that can be applied to useful purposes?*

It is due to Mr. Nicholls' invention to observe, that whatever power may be derived from the *libration* of *suspended weights*, only a portion of that power can have been employed in the experiments to which these observations apply, for the pump used in these trials

was only attached to a single arm on one side the axis; but had the pump been constructed double, so as to admit of a connection at each side the axis of motion, the quantity of water raised must have been greatly increased, as will appear obvious, from a consideration of the drawing.

The approximation of the improved lever to the principle of the pendulum is sufficiently obvious, and the number of vibrations in a given time are of course limited by the general principle; experience, however, must determine the amount of weight that may be advantageously suspended, as well as the distance of the centre of oscillation from the (axis of motion or) centre of suspension.

I am, Gentlemen,

Yours, &c.

King Square, Oct. 1830. J. RAYNER.

Recent Patents.

To JOHN STREET, *of Clifton, in the county of Gloucester, Esq. for his invention of a new mode of obtaining a rotatory motion by water, steam, gas, or other vapour, being applicable also to the giving blast to furnaces, forges and other purposes, where a constant blast is required.*—[Sealed 5th August, 1830.]

SPECIFICATION.

"MY new mode of obtaining a rotatory motion by water, steam, or gas, or other vapour, and which is applicable also to giving blasts to furnaces, forges, and other purposes, where a continued blast is required, consists in the employment of a novel construction of rotary engine, the particular features of which are set out in the accompanying drawing, see Plate IV.

Fig. 1, represents the external appearance of the engine complete, as seen in front; fig. 2, the same seen endways; A, A, are two distinct cylindrical vessels fixed to a basement; through the centres of which cylinders, the hollow axle B, B', B, passes. Within each of the vessels A, A, there is a rotary piston and lever valve, which will be described hereafter; fig. 3, is a longitudinal section of the machine, taken through the middle in the direction of fig. 1, and fig. 4, is a transverse section of one of the chambers with its piston C, and valve or steam slips D; fig. 5, is another section taken in the same direction, supposed to represent the other vessel.

The cylindrical vessels A, I propose in preference, to be made of cast iron, as most eligible, but other materials will answer the purpose. The interiors of the cylinders must be rendered perfectly true, and their sides flat, in order that the edges of the pistons may fit closely and steam tight, as they go round; the axle B, B, is hollow throughout, but closed at its ends, and is turned perfectly true and cylindrical on its outer surface; the pistons C, C, stand radially from the axle to which they are affixed, in diametrically opposite directions in the two cylinders, as shewn by dots in figs. 4 and 5. I propose to make them of sheet iron, cut to a rectangular figure, corresponding to the form of the interior of the cylindrical vessels.

On the front or advancing side of each piston I attach a curved bar *a*, for the purpose of giving stability to the plate, and is intended to act as a wiper in raising the valve or steam stop. A portion of the upper part of each cylinder is removed to the extent of about sixty degrees of its circumference, and a rectangular box E, E, formed over it, which, with the cylinder, constitutes the close vessel that the piston moves in.

The lever valve or steam stop D, is a rectangular plate of iron, or other suitable material, mounted on pivots *b, b*. The lower edge of the valve bears upon the periphery of the cylindrical axle, and in that situation acts as a steam stop or partition dividing the vessel. The valve is packed on its edges and back to prevent the passage of steam.

"Having described the construction of the cylindrical vessels A, with its piston C, and valve or steam stop D, it is only necessary to say, that both the cylindrical vessels, with their pistons C, and valve D, are precisely alike, and that there being one common axle passing through both, with the pistons placed in opposite directions, the operations of the pistons are reciprocal. The outer extremities of the hollow axles, which are closed, have gudgeons on the ends, which will be seen in figs. 1, 2, and 3, and are supported on standards G, G, with plummer boxes for them to turn in. A steam pipe H, leading from a boiler, situate at any convenient distance, conducts steam of any desirable pressure into the steam box, I, which embraces the hollow axle, and is properly packed, to prevent the loss of steam. From this box I, the steam passes into the hollow axle B, through apertures *e, e*, fig. 3, and having filled the hollow axle, the steam proceeds through the other apertures *f*, and *g*, up the pipes K, and L, into the cylinder. The induction apertures *f*, and *g*, for delivering the steam from the hollow axle, are to be on opposite sides of the axle, so that when the steam is passing up the pipe K, into one of the cylinders, it is shut off from the pipe L, and the other cylinder, and vice versa. The apertures for admitting the steam into the pipes K, and L, are made at *h, i*, in the upper parts of the outer flanges of the cylinder, as will be seen in the longitudinal section, fig. 3; they may be of any convenient width, but are to extend round only

about seven sixteenths of the circumference; and the corresponding aperture *f*, and *g*, in the axle, is to be about six sixteenths of the circumference. The apertures through the axles at *f*, and flange at *h*, towards the left end of the machine, as seen in fig. 3, being now supposed to be open, the steam will pass up the pipe K, into the box E, and thence into the left hand cylinders, the transverse section of which, with the position of the piston and valve as now situated, is shewn by fig. 4. The steam thus blowing into the cylinder, meets a firm resistance against the inclined valve or steam stop D, but pressing also against the back of the piston C, forces the piston round in its circular course within the cylinder, and gives to the axle a rotatory motion, which may be applied as a first mover to the driving of other machinery. By the time that the piston C, in fig. 4, has arrived at the situation shewn by dots, the piston in the other cylinder has been brought into a similar situation to that in fig. 4, ready to receive the force of the steam, and in passing round this circuit, the wiper *a*, at the back of the piston C, has raised the lever valve D, for the purpose of enabling the piston to pass, as shewn in fig. 5. By the time that the piston has arrived at the situation shown by dots in fig. 4, or further in advance, above forty-five degrees, the induction aperture has become closed, and the piston is carried forward by the action of the steam upon the piston in the other cylinder, until it has arrived at K, which is the eduction or exit aperture through which the expended steam is allowed to escape.

"The steam being admitted through the induction aperture, at the reverse end of the axle, passes into the other cylindrical chamber, and forces the piston round, raising the steam stop or valve in the way already described; by which successive admissions of steam, the

pistons with the axle are made to perform a continuous rotatory motion.

In the foregoing I have described the lever valve, or steam stop, to fall by its gravity upon the axle of the piston, which in some cases may be found objectionable, I therefore shall describe my method of counter balancing the steam stop, so that its fall may be regulated. The ends of the pivots or axle on which the steam stop turns, are made to project through the side of the box E, of the cylindrical chamber; and on the end of one of the pivots a lever *l*, (see fig. 2), is affixed, with a counter balance weight *m*, attached to its end. This weight may be adjusted by sliding it up or down the lever, so as to wholly or partly balance the steam stop as may be required; the parts round the pivots being packed steam tight.

Another mode of balancing the steam stop is shewn in fig. 6, where it will be seen that the rectangular box or chamber E, E, is enlarged, for the purpose of enclosing the counter balance weight *n*, which does not require the pivots or axle of the steam stop to project through the side of the cylinder, but the upper end and the edges of the counter balance *n*, must be steam tight in this situation. I do not, however, intend to confine myself to these particular modes, as there are other methods of balancing the valve than those I have described, nor do I intend to confine myself to the mode described of lifting the lever valve or steam stop, by means of the wiper on the rotatory piston within, as I propose under some circumstances, to raise these steam stops by means of wipers on the outside of the cylindrical chambers, as shewn in the end view, fig. 7, where *o*, is an arm or lever affixed on the end of the axle of the steam stop or valve, and *p*, a wiper fixed on the rotatory axle of the piston, which as it revolves, coming in contact with the

arm or lever, raises it, and consequently the valve also, which will enable the piston to pass as already described.

I sometimes construct my rotatory engines with a solid axle, and in that case pass the steam direct to the cylinders through the steam pipe from the boiler, and regulate the supply and admission of the steam by peculiarly formed valves contained within the steam pipe, by which I dispense with the hollow axle and the steam box before described.

"Fig. 8, is an end view, and fig. 9, a front view of one of the cylinders of an engine upon this construction; *q*, is the steam pipe leading from the boiler, having the enlarged part at *r*, formed into a box, to allow the regulating valve to work in; this valve is like the ordinary throttle valve of a steam engine, and is opened and shut by a lever *s*, on the end of its axle; which lever is acted upon by a rotatory cam *t*, fixed on the main axle of the engine. This cam has a part of its periphery removed, for the purpose of allowing the end of the lever to fall upon its smaller diameter, and close the valve (as shown in the section, fig. 10), during the time required. The rotation of the cam continuing, it will raise the lever into its former position, and open the valve to admit the steam. There being two branch steam pipes to supply both cylinders, and a valve in each, and the cams and levers so regulated, that as the one valve is closed shutting off the steam from its cylinder, the other is opened and admits the steam into the cylinder, to act upon its piston, and thus gives a continuous rotatory motion to the main axle of the engine. Another regulating valve, which may be used in place of the ordinary throttle valve of the engine, is shewn at figs. 11, and 12, and consists of a plate *u*, fixed across the steam pipe, having two holes *w*, *w*, made through it, of equal dimensions; these holes are closed

so as to prevent the passage of steam by two valves *x*, *x*, one of which closes on the upper side of the plate, and the other on the under. These valves are connected together by the bent arms *y*, *y*, which are fixed on the axle *z*; this axle is placed across the pipe, and projects out at the side, where a lever may be affixed and worked by a cam on the axle, as before described. It will be understood that these valves may be so adjusted as to regulate the admission of the steam into the cylindrical chambers as desired, and the steam may be cut off, and the valves kept closed at any required part of the revolution of the piston, and the expansive force of the steam used to continue its rotation.

" Although I have described steam only as acting upon the pistons of the engine in the foregoing description, yet I wish it to be understood that the actuating or motive power to work such engines may be the gravity of water, the expansion force of steam, gas, or condensed air, or any other elastic vapour.

" The same principles described under my rotatory engine, will apply to the construction of rotatory bellows, or blowing machines, by which a continued blast may be kept up.

" Figs. 13, 14, and 15, are representations of such blowing apparatus. Figs. 13, and 14, are sections, shewing the parts in different positions; and fig. 15, a top or bird's eye view of the outside; *a*, is the case or cylinder, in which the piston *b*, revolves; *c*, is the aperture for the admission of air into the cylinder; *d*, is the valve or stop which divides the air aperture from the exit pipe *e*; *f*, is the axle of the piston, having a winch handle *g*, on its end. On a rotatory motion being communicated to the axle by the winch handle, or any other means in the direction of the arrow, the piston will be carried round, forcing the air before it out of the cylinder through the exit

pipe *e*. As the piston revolves, the wiper on the piston coming in contact with the curved end of the stop valve, raises it, as shewn in fig. 14, and the piston is allowed to pass when the stop falls down again, to be ready for the next revolution of the piston. The exit pipe *e*, is connected to a box or air chamber *h*, into which its end is open, when the air is being forced out of the cylinder, and through the nozzle or pipe *i*, leading to the furnace. On the blast ceasing, the valve *k*, closes the end of the pipe. At this time the piston in the other cylinder *l*, (see fig. 15), is acting upon the air, and forcing it out through the pipe *m*, into the air chamber, as before; thus keeping up a continuous blast: the valves at the end of the pipes in the air chamber alternately opening and closing, as the piston of either cylinder comes into operation."—[*Inrolled in the Petty Bag Office, Oct.* 1830.]

Specification drawn by Mr. Newton.

To John Knowles, *of Farnham, in the county of Surrey, Hop Planter, for his invention of a certain instrument or machine, for drawing hop poles out of the ground previous to picking the hops, and which by drawing the poles perpendicularly will greatly save them, as well as prevent the hops from being bruised; called a hop drawer, by a lever and fulcrum.*—[Sealed August 13, 1830.]

This invention is intended to prevent the injury done to hops in the common method of drawing out of the ground the poles, round which the hops are trained. The hop poles, in the usual way of drawing them, are shaken or moved backwards and forwards, in order to loosen them

in the ground, and are necessarily forced against the other poles to the injury of the hops, which become bruised and broken off; the poles likewise are often much injured and broken near the ground, which inconveniences are proposed to be obviated by this invention.

The apparatus consists of a lever having one end formed into a long handle, and the other end branched into the shape of a fork, with teeth or notches at the inner parts of the fork, for the purpose of taking fast hold of the hop pole. This lever has its fulcrum in a leg or crutch, to which it is attached by a pin and hinge joint, the leg being carried about with the lever when in use.

The forked end of the lever is to be applied to the pole intended to be drawn out of the ground, and the teeth or rough notches in the prongs of the lever prevent the pole from slipping through, when the instrument is applied to draw a pole out of the ground.

The leg or crutch in which the fulcrum of the lever is fixed is made with an enlarged end or foot, to prevent its being forced into the ground by the pressure required to overcome the resistance of the poles when drawing.

Figures 16, 17, and 18, Plate IV. are representations of the apparatus or machine. Fig. 16, is a plan or horizontal view, looking on the top. Fig. 17, is a side view of the same in the position the instrument is when applied to a hop pole, in order to draw it out of the ground; and fig. 18, is another side view of the instrument taken when the handle of the lever has been depressed, and the shorter or forked end raised, and with it the hop pole; *a, a,* is the lever with its forked or branched arms *b, b,* having the teeth or notches *c, c,* on the inside; *d,* is the crutch or leg, the fulcrum *e,* of the lever bearing on the top. The lower part of this crutch is enlarged as at *f,*

and is shod or covered at its end with an iron plate, where there is also a spike or pin fixed to prevent it from slipping when the power is applied to raise the hop pole out of the ground.

The method of applying this instrument is so fully shewn by the figures, that it is scarcely necessary to describe the manner of its action. The forked end of the lever is to be brought into contact with a hop pole near the ground, with the longer end or handle raised, and the fork taking hold of the hop pole, as low down as may be thought proper, the longer end or handle is then to be depressed, keeping the forked end in contact with the pole, with a slight pressure, when as the short end of the lever rises, the pole will be drawn out of the ground in a perpendicular direction, without shaking the hops; the joint at the fulcrum on the leg allowing the lever and crutch to accommodate themselves, to the motion of the pole as it rises.—[*Inrolled in the Rolls Chapel Office, October,* 1830.]

To SAMUEL WRIGHT, *of Shelton, in the Staffordshire Potteries, for his invention of a manufacture of ornamental tiles, bricks, and quarries, for floors, pavements, and other purposes.*—[Sealed 26th Jan. 1830.]

THE Patentee says that his invention consists, in the first instance, in the manufacture of tiles, bricks, and quarries, in various shapes and sizes, from the *finer* clays, and other materials used for making porcelain and earthenware, and not from the coarser materials hitherto used for such purposes; and in combining such materials, and so firing them, as to produce a hard solid semi-vitrified substance, more durable than stone or marble.

In the second place, in ornamenting such tiles, bricks, and quarries with various colours and patterns, similar to the patterns on carpets, and oil-cloths; or representations of coats of arms, or crests; or imitating marbles, or Roman tessellated pavements, or any other fancy patterns, by impressing the intended patterns or figures upon the tiles, bricks, and quarries, previously to firing them, and afterwards filling up, or in-laying the parts so impressed with clays and other materials, previously prepared and coloured with metallic oxides.

The manner in which the said patterns or figures are to be impressed, is by forming them in moulds of plaster of Paris, which moulds are imbedded or inclosed in metal cases, whereby the plaster moulds are protected from injury, and are enabled to bear a great degree of pressure, and consequently to indent very clear and perfect impressions.

After the impressions have been filled up or inlaid with the coloured clays, and substances before mentioned, and after the tiles, bricks, and quarries have acquired a proper degree of dryness for the purpose, they are reduced to an equable and exact thickness in a machine, and cut or pared by a cutting instrument, worked upon the frame of the machine, whereby the upper surface is gradually planed down to a clean and distinct exhibition of the pattern, and both the upper and lower surfaces are rendered exact and smooth, and thus capable of forming a perfectly level floor or pavement.

The machine consists of a square cast iron box, the uppermost edges of which have steel plates fastened on them, to prevent their being worn away by the cutting instrument passing over them; and within the box is a brass plate, forming a platform, upon which the bricks, tiles, or quarries are placed, to be planed or cut.

At each corner of the platform there is a female screw, through which an upright male screw works, with a small cog wheel fixed to it; these wheels are simultaneously turned by one central wheel, placed on an upright shaft, which is driven by a winch.

The platform and steel edges of the box are to be ground together, in order to render them perfectly level; when by turning the winch, the platform will be raised or lowered with its surface exactly parallel with the edges of the box, by which the stroke of the cutting instrument is governed. Although this effect is very easily produced by using the winch, yet no degree of pressure upon the platform will, of itself, lower its elevation, and consequently the exact thickness of the tiles, bricks, and quarries, can never be accidentally varied.—[*Inrolled in the Petty Bag Office, July,* 1830.]

To JOHN PATERSON REID, *of Glasgow, Merchant, and Manufacturer, for his invention of an improvement or improvements on power looms, for weaving cloth, of various kinds.*—[Sealed 4th April, 1827.]

IN the manual operation of weaving by the ordinary hand loom, the workman swings the vibrating batten to and fro upon its centres, for the purpose of enabling him, first, to drive the shuttle across between the open sheds of the warp threads; and, secondly, to beat up the shoot or weft thread, so as to render the texture of the cloth close and firm. The same is required to be done by machinery, in the power loom, and the object of the invention above recited is for this purpose,

Plate IV. fig. 19, is an end elevation of a power loom, with the present improvement adapted; *a, a,* are the

standards, or end frames of the loom; *b*, is the batten, with the reed and shuttle *c*. The batten in this instance, does not vibrate upon centres as usual, but slides to and fro in horizontal directions, by means of guide rods *d*, which pass between guide rollers *e*, *e*. This however is not absolutely essential to the invention, as a vibrating batten may be employed, instead of a sliding batten.

The warp threads wound upon the beam *f*, are passed over the tension roller *g*, and through the reed of the batten at *c*, to the breast *h*, and near that point the cloth is made by the intervention of the warp and weft threads, which are here beaten up, by the advance of the reed.

The to and fro motion of the batten, carrying the reed, is usually effected in a power loom by a rotary crank; but, in this improved loom the batten is actuated by an arm *i*, connected to an excentric wheel *k*, *k*, at one end, and to a spring *l*, fixed to the under side of the batten at the other end. This excentric wheel turns upon an axle, at *m*, and as it revolves, its periphery acts against a friction roller *n*, at the end of the batten, in order to guide the batten steadily as it advances and recedes.

When the smaller radius of the wheel *k*, is in contact with the roller *n*, the batten is brought back, which is the time that the shuttle is projected across between the sheds of the warp; the wheel is therefore made with this part of its periphery nearly concentric, in order that it may continue revolving without advancing the batten, until the shuttle has got clearly through the warp, and become lodged in its box, at the end of the shutter race. The opposite radius of the excentric wheel is large, in order to push forward the batten with considerable force, which is requisite in beating up the weft thread.

It will hence be perceived that the excentric wheel *k*, and the arm *i*, act together in giving the to and fro sliding

motion to the batten; but, as some degree of elasticity is necessary in beating up the weft, in order to prevent the warp threads from breaking, the rod *i*, as before said is attached to a spring *l*, which allows the batten to recede a little, when driven up with force.

This spring *l*, may be made in any way that shall be found eligible; a long rod fastened at one end only to the under side of the batten is preferred, and which by being adjusted, may have its elastic force increased or diminished according to the quality of the work to be made.

Various parts of the power loom shewn in the figure above referred to are not new, but are employed in conjunction with the improvement, it is therefore to be observed that the only features of novelty claimed by the Patentee, is the excentric wheel, or any other description of cam, or wiper, which may be capable of actuating the batten; and the spring, or elastic attachment of the conneceting arm, by which the batten is impelled in beating up the weft.—[*Inrolled in the Inrolment Office, October*, 1827.]

To George Harris, *of Brompton Crescent, in the county of Middlesex, Captain in the Royal Navy, for improvements in the manufacture of ropes, and cordage, canvas, and other fabrics or articles, from substances hitherto unused for that purpose.*—[Sealed 15th September, 1829.]

The object of this invention is to produce a rope, or sail cloth, which shall be impervious to water.

The Patentee proposes to employ as the substance of his improved ropes or cordage, a vegetable production, called *silk grass*, which when dried is to be beaten and heckled in the same manner that flax or hemp is usually prepared. In the process of preparing the grass, it is proposed to

introduce a bituminous and gummy material, which is intended to saturate the fibres of the grass, for the purpose of preserving the ropes, cordage or sail cloth, or any other fabric made from it, when exposed to the effects of damp.

This gummy material is to be compounded of the milk of a tree called the *ficus indica*, with *asphultum*, or *bitumen judaicum*, and *cocoa nut oil*. The proportions are to about twenty five gallons of the milk, one gallon of the oil, and from one to twenty gallons of the bitumen, according to circumstances.

These substances when properly combined, which may be done over a slow fire, constitute a gummy material, into which the fibres of the grass may be dipped while heckling, and it also may be applied in twisting or spinning. It is likewise proposed that the workmen in twisting the strands of cord, shall dip their hands in the material, and work it well into the fibres and texture of the rope.

When this gummy material has become dry, it will resist water, and prevent the rotting effects of damp upon the fibres of the rope, cordage, sail cloth, or other articles manufactured from it.—[*Inrolled in the Petty Bag Office, March*, 1830.]

To Henry Knight, *of Birmingham, in the county of Warwick, Clock-maker for his invention of a machine, apparatus, or method for ascertaining the attendance to duty, of any watchman, workman, or other person; which machine, apparatus, or method, is applicable to other purposes.*—[Sealed 28th April, 1827.]

This contrivance is to be connected to a clock, and consists principally in a lever with a string, which being pulled by the watchman every time that he goes his rounds,

causes a mark to be made with a pencil, or marker upon a dial plate, corresponding to the precise time of the night when the string was pulled; by which means the master, on afterwards looking at the face of the clock, may perceive at once on how many occasions the string has been pulled, and at what precise times; so that if the watchman has neglected to go his round with regularity, such neglect will be shewn upon the face of the dial.

Plate III. fig. 6, is a side view of the apparatus; *a, a,* is the frame work of the clock, the works of which need not be shewn; *b,* is the arbor or axle supposed to carry the hour hand; *c,* is the dial plate made circular, with the hours and quarters depicted upon it; this dial plate is affixed to the arbor *b,* by a finger screw *d,* and of consequence revolves with the arbor, instead of an hour hand: the index being stationary at *e,* above. A lever *f,* is mounted upon an axle at *g,* and to the tail of this lever the string *h,* is attached.

Whenever the string *h,* is pulled, which it is intended the watchman shall do every time that he passes the clock in going his rounds, the reverse end of the lever will rise, and with it the index *e,* which having a pencil placed in it, will make a straight mark upon the face of the dial plate, near the edge, against the hour, or quarter, at which the string was pulled; and on the string being released, the spring *i,* will force the lever back again to its former quiescent position.

As the dial plate continues going round, the next time that the watchman pulls the string, a mark will be made upon the dial plate in another place, indicating the time as before; and so on a succession of marks will be made, which on inspecting the dial plate the next morning, will shew whether the watchman has attended his duty regularly.

In order that the plate of the real dial may not be de-

faced by the marks, it is proposed to substitute a temporary, slate, dial plate, to be affixed to the arbor *b*, in contact with the real dial plate: a little larger in diameter, and extending on the outside of the real plate. This temporary dial plate may be of paper, and attached in the same way, by a finger screw, to the going arbor or axle *b*; and a series of them being provided, one for every night, and dated, by preserving the paper dials, a register of the watchman's attendances may be kept for any length of time.

In order that the trouble of repeatedly pointing a pencil may be avoided, it is proposed to put a small roller of metal, in place of the marker *e*, which will give a sufficiently evident mark upon the paper; and that the marker may be kept in contact with the paper as it moves up and down, a small spring is attached to the end of the lever at *k*. The dial may be secured within the house, and the string of the lever be carried to the outside by small cranks.—[*Inrolled in the Inrolment Office, October*, 1827.]

To Thomas Clarke, *of Market Harborough, in the county of Leicester, Carpet and Worsted Manufacturer, for his invention of certain improvements in manufacturing carpets.*—[Sealed 26th May, 1827.]

The Patentee considers that there are two points of invention which he may claim under this patent; the first, is a superior quality of Venetian carpeting; the other an improved mode of weaving it.

In the first instance, it is proposed to employ a greater number of worsted threads in a given space, than has heretofore been employed in making a Venetian carpeting; and also to extend the pattern, as of a flower, much wider than heretofore; indeed one subject or pattern may extend the whole width of the carpet, if required, without

repetition: which in that description of goods, has never been done before.

In the second place, the French figure weaving loom, called the Jacquard, or Lyons loom, is employed, but with some improvements. In order therefore to understand the improvements, it will be necessary to examine the construction and principles of the Jacquard loom, which is particularly described in the First Series of our Journal, Vol. II. under Lambert's Patent, page 95, and Wilson's Patent, page 255.

In the Jacquard loom there are several rows of hooks with rods attached to the warp threads, certain of which rods are to be raised at every throw of the shuttle, for the purpose of lifting certain parts of the warp, to produce the required pattern; which rods are acted upon by a series of cards, or boards, pierced with holes in certain parts, and blank in others (previously regulated by the pattern drawer) in place of the old mode of lifting the warps by a draw-boy.

The Patentee proposes to employ double rows of hooked rods, the hooks standing in opposite directions; which will enable him to put a much greater number of warp threads in operation, and to produce larger patterns, without increasing the weight of the operative parts of his carpet looms. It will be necessary in this contrivance to employ double sets of cards, or boards, acting together, the holes or perforations and blanks of which corresponding cards, shall be the reverse of each other, that is the situations of the perforations in one card, shall be occupied by blanks in the other, and *vice versa*; consequently there must be two revolving hollow lantern rollers to guide the two sets of cards. By this contrivance the loom may be worked with one treadle instead of two.—[*Inrolled in the Inrolment Office, Sept.* 1827.]

To Charles Phillips, *of Rochester, in the county of Kent, Captain in our Royal Navy, for his invention of certain improvements on capstans:*—[Sealed 8th June, 1827.]

Captain Phillips obtained a patent in September, 1819, for improvements on capstans, upon the basis of which original invention the present improvements are founded. In the former instance (see the second volume of our First Series,) it was stated, that the evident want of power in the usual mode of weighing anchors, led the inventor to devise a means of overcoming that difficulty; and aware that mechanical power might be obtained in many ways, his principal study was simplicity, and the adaptation of such means as could be used with the greatest convenience at sea, and which mariners in the darkest night could not by any possibility mistake in applying.

The leading features of that invention were the introduction of a series of toothed wheels, and a toothed ring at the lower part of a double capstan, which produced what is commonly called a sun and planet motion. By means of this gear on turning the capstan below deck, the upper capstan upon deck, which was mounted upon the same axle, was made to turn slowly, but with greatly increased power; by which means the assistance of a few men below very materially aided the exertions of those upon deck, and the anchor could be raised with comparative ease, although there might be a scarcity of hands capable of being brought to the work.

In the former invention, the barrel of the lower capstan turned loosely upon the upright shaft, on which the upper capstan was fixed, and when the lower capstan was bolted to the gear work, and driven round, the gear caused the shaft carrying the upper capstan to turn with increased mechanical power. As however it was not ne-

cessary at all times to work the capstan with that increased power, there was a mode of connecting the barrel of the lower capstan to the central shaft, or of detaching it from the shaft when required, by means of a sliding clutch box, which fitted into a square part of the central shaft, and secured the barrel of the capstan and the shaft together.

The object of the present invention is to dispense with the said clutch box, which being raised and lowered by levers was found rather too complicated to suit the habits of seamen. It is therefore now proposed instead of the clutch box, to affix a loose drum head to the central shaft, and to connect this drum head to the barrel of the capstan when required, by means of bolts or pins.

Plate III. fig. 5, shews the double capstan, with the gear below to obtain power, as in the former invention. The lower capstan is represented in section, in order to exhibit the manner in which the detached drum head is occasionally connected to the barrel: *a, a,* is the barrel; *b,* the central shaft; *c, c,* the drum head; *d, d,* are bolts, which being lowered into the recesses in the barrel, lock the drum head and the barrel together; but when it is required to detach them, the bolts may be raised up so as to disconnect the two parts of the capstan.

The bolts have each a pin introduced into their side, or passed through them, which pin, when the bolt is raised, and turned round, rests upon a ledge or aperture in the drum head, and thereby the bolt is retained, and prevented from falling down into the recess of the capstan barrel, so as to lock it; and also renders it unnecessary to remove the bolt from the drum head, which might if withdrawn be mislaid or lost.

The Patentee states that it is not absolutely necessary to employ a drum head detached from the barrel of the cap-

stan; as a block, or two bars combined, and securely attached to the central shaft, with similar bolts passed through, might be substituted in place of the detached drum head, and answer the purpose perhaps equally well. —[*Inrolled in the Inrolment Office, December* 1827.]

To John Wright, *late of Princes-street, Leicester-square, but now of Jobbin's-court, Knightsbridge, in the county of Middlesex, Engineer, for his invention of certain improvements in window sashes*—[Sealed 11th October, 1827.]

These improvements are intended to be adapted to that description of window frames, called French casements, and are designed for the purpose of preventing the wind and rain from insinuating under the window frame, at the sill.

A groove is formed in the sill, extending the whole length of the window, in which a horizontal bar is placed upon vibrating levers, that allow it to be raised or lowered. When the window frame is closed and fastened, a perpendicular slide bolt presses upon the ends of the levers, and causes the bar or horizontal bolt to be raised, which, is by that means introduced into a groove in the under part of the bottom rail of the casement, and the window becomes securely locked.

Plate III, fig. 7, is a section of the sill, and the window frame or casement taken transversely; *a, a,* is the sill of the window; *b,* the lower rail of the casement, in which *c,* is the notch for the bolt to pass into, and *d,* is the bolt or horizontal bar, in its depressed state.

Fig. 8, is a longitudinal section of the bar *d,* which is made hollow, for the purpose of introducing the levers

e, e. These levers are mounted upon axles, at *f, f,* which have their bearings in the bottom of the groove, and when the perpendicular bolt *g,* is slidden down, as in fastening the window; it causes a pin at *h,* to press upon the ends of the levers in the centre of the bar, and to depress those ends, at the same time raising the outer ends of the levers *e, e,* which lift the bar *d,* up into the notch or groove *c,* in the lower rail of the window frame.

Fig. 9, shews a transverse section of the sill and the window frame, as fig. 7; but in this instance the perpendicular bolt *g,* is depressed (the window being fastened), and consequently the horizontal bar *d,* is raised up into the notch *c,* and wind and rain are prevented from passing under the window frame into the room.

The Patentee claims the raising and depressing of the horizontal bar upon levers, for the purpose of locking the window, and keeping it weather tight, but he does not claim the perpendicular bolt, which has been employed before, though not for the same purpose.—[*Inrolled in the Inrolment Office, April,* 1828.]

To MAURICE DE JONGH, *of Warrington, in the county of Lancaster, Cotton Spinner, for his invention of an improvement, or improvements in machines adopted for spinning, doubling, twisting, roving, or preparing cotton, and other fibrous substances.*—[Sealed 4th December, 1827.]

THESE improvements are founded upon the Patentee's previous inventions, of combinations of mechanism, to produce a self-spinning mule; or a similar kind of spinning machinery: for which inventions, patents were granted in March 1825, and December 1826; the specifications of

which are reported in the Thirteenth Volume of our First Series, and the First Volume of our Second Series. In both these instances we set out the whole of the machinery, and explained all the parts, of which the specification of the present patent is in a great degree a repetition, but with the recent improvements added thereto.

The specification is extremely long, and is accompanied with several sheets of drawings, containing numerous figures of the minute parts of the machinery; we have therefore endeavoured to extract such portions of the subject, as would explain the points of novelty at present claimed; but by the explanation, the improvements appear to be so essentially involved in the whole construction of the machine, that we find ourselves unable to give any thing like an intelligible description of the present improvements; and can only say, that they refer principally to the means of driving the machinery, and of throwing it in and out of gear, and to the tempering, or qualifying of the several movements of the mechanism; in order to render the taking up, or winding of the yarns into the spindles, or cops, uniform under all circumstances, from the beginning to the end of the operation; that is until the cops are wound full, and ready to be removed from the mule.—[*Inrolled in the Inrolment Office, June,* 1828.]

To WILLIAM FAWCETT, *of Liverpool, in the county of Lancaster, Engineer, and* MATTHEW CLARK, *of the island of Jamaica, Engineer, for their invention of an improved apparatus for the better crystallization of sugar from the canes.*—[Sealed 4th December, 1825.]

THE leading feature of this invention is the application of high pressure steam to the external surfaces of sugar-pans

or vessels in which the cane-juice is boiled, for the purpose of concentrating its crystals, that is, evaporating the aqueous parts from the sugar.

Any peculiar form or disposition of the vessels does not appear to be essential; but such an arrangement must be adopted, as will allow of the steam from a high pressure boiler to be brought in contact with, or surround the several pans in which the molasses or cane-juice is placed for evaporation.

It is proposed to construct a very strong steam-boiler of wrought or cast-iron, having the furnace and flues within surrounded by the water, so that little or no heat may be lost by radiation. This boiler is to be proved to bear the resistance of steam at a pressure considerably greater than it will ever be required to be employed, and safety-valves are to be placed in suitable situations, to prevent explosion. On the top of this boiler the sugar-pans are to be mounted, with jackets surrounding their lower surfaces, connected by flanges packed steam-tight. From the boiler, pipes are to be laid, for the purpose of conducting the high-pressure steam into the spaces between the pans and their jackets, the heat of which will cause the molasses, or cane-juice in the pans to boil, without subjecting it to burning, or baking on to the internal surface of the pan.

The pans may be connected in any other way with a generator of high-pressure steam, which steam may be conducted under the pans by pipes or other means, and the steam-boiler or generator may be employed at the same time to drive the engine, or other machinery connected with the sugar-works.

The ends of the flues in the boiler are to discharge themselves into other flues leading to the chimney, but they must be furnished with dampers, to prevent the heat from passing away too freely; and additional pans may be

placed in connexion with the chimney or flues, by which the heat of the vapour and smoke may assist in preparing the liquor for the crystallizing process,

[*Inrolled in the Petty Bag Office, June,* 1828.]

To MATTHEW FULLWOOD, junior, *of Stratford, in the county of Essex, Gentleman, for his invention of a cement mastic, or composition, which he intends to denominate German Cement.*—[Sealed 6th May, 1828.]

THE materials of which this cement is to be made are a Gloucestershire stone, commonly called Painswick Rag; another stone, from the same county, called Bisley Stone; and black rock, from the neighbourhood of Bristol and Clifton.

These stones, in the proportionate quantities of a ton of Painswick Rag, half a ton of Bisley Stone, and one ton of black rock, are to be broken into small pieces, mixed together, and burnt; the material may then be ground, and made up into cement with water, and when dry, will be found to be hard and durable, and something lighter in colour than Roman mastic. This colour may be rendered still lighter by additional burning.

[*Inrolled in the Petty Bag Office, July,* 1828.]

To JOHN BARTLET, *of Chard, in the county of Somerset, shoe-thread-manufacturer, for his invention of a new and improved method, or methods, of manufacturing process, for preparing flax, thread, or yarn, for use in the manufacture of boots, shoes, saddlery, and of sails and sail-cloths and bagging.* [Sealed 16th June, 1828.]

THE mode of preparing the flax threads or yarns for the use of shoe-makers, saddlers, and sail-makers, proposed

by the Patentee, is by immersing the threads in a strong solution of oak bark, made hot. The degree of strength is not mentioned, nor the time requisite for the threads to be immersed. One steeping, it is said, will be sufficient to harden and strengthen the fibres of the thread, and render it very durable.

[*Inrolled in the Petty Bag Office, August,* 1828.]

Novel Inventions.

Galloway's Smoke Consuming Furnace,

In the number of our Journal for September last, Vol. V. (Second Series), page 340, we gave the Specification of Cochrane and Galloway's patent for their smoke consuming furnace, but as several important improvements and variations in the details of the invention, have been made since the original Specification was inrolled, we feel it incumbent upon us to furnish a few additional particulars illustrative of its present improved state.

We need hardly say that oxygen is essential to combustion, and as such, that the greater the supply of that gas to any mass of burning fuel, the more rapid will be its combustion and operation in eliciting heat.

Now, a knowledge of this fact will serve to illustrate one of the most important features in the furnace before us; viz. instead of trusting to the ordinary supply of atmospheric air, Mr. Galloway produces an artificial blast with bellows of any of the ordinary kinds, and by the aid of an air tight furnace, brings the whole of the air thus compressed into contact with the burning fuel. By this arrangement a small furnace is made to supply

the place of the unwieldy grates hitherto employed for steam engines; an achievement of the greatest importance in the construction of loco-motive engines for rail roads.

The second, but by no means less valuable featured, in Mr. Galloway's invention, is the contrivance by which it is rendered a *complete smoke consuming furnace.* We have seen the fuel repeatedly supplied, and that too in large quantities, without as much smoke being discharged as would have proceeded from an ordinary drawing room fire. Instead of a torrent of unconsumed carburetted hydrogen and soot, arising from the chimney, as is usually the case, by the abundant supply of oxygen, to which we have already alluded, the whole vapour is converted into so much useful fuel, and a very great advantage on the score of economy is the result.

Fig. 10. Plate III, is a view of the complete apparatus in section, as it is now employed in Mr. Galloway's factory, in West Street, Smithfield. The furnace and flues *a, a, a,* are surrounded by the water contained in the boiler *b,* so that the heat lost by radiation is reduced to the smallest possible amount; *c,* is the ash pit, which may be considered as air-tight, with regard to the external atmosphere; *d,* the air service-pipe, proceeding from a pair of bellows worked by the engine. The air, on entering the ash pit, is distributed beneath the furnace bars, and passing between them becomes combined with the burning fuel, and thereby produces the most intense ignition. A small branch pipe at *e,* serves to add to the effect of the first arrangement, and by carrying in a current of air on the top, ensures the combustion of the smoke; *f,* is a valve or air-tight door, with a cavity in it, containing water; the door is furnished with a screw, and bridge, to bring it in perfect contact with the seat

round the aperture of the furnace mouth, in which it rests.

The coal or other fuel is introduced into the hopper *g*, by raising the valve and lever represented above. The fuel then rests on the slide *h*, which, to discharge it into the furnace, is removed by the aid of a pinion and rack, so that when the coal is introduced into the hopper, the slider *h*, is closed air-tight, and when discharged into the furnace, the upper valve is closed, keeping the furnace perpetually air-tight at the upper part.

The mode of cleaning the flue is perfectly simple, and has a great advantage over those in general use, as it will be seen by a reference to the figure, that the engine man has only to remove the caps *i*, *i*, and he may at once, with perfect ease, gain access for that purpose.

AMERICAN PATENTS.

(From the Franklin Journal)

A Self-moving Cradle.—ANTHONY BUCHENBERGER, *New York.*

A COMMON swinging cradle is to be made to vibrate by a spring movement, like that of a time-piece. which is to be let into one of the uprights, and of this movement the cradle becomes the pendulum.

The claim is to "the method of working a cradle, and the adaptation of the movement above described."

In the days when cradles were as numerous as infants, and swaddling-bands and chin-stays were accounted necessary to preserve the juxta position of the joints, it was frequently proposed to rock the child to sleep by clock-work, and we have little doubt that it has actually and repeatedly been carried into practice; at all events, the proposition of the matrons and the nurses is now to be realized, and our children are to be made to sleep against

time, provided their parents consent to it. We are very apprehensive, however, that the determined departure of the moderns from the usages of primitive times, will interfere with the patent mode of inducing sleep, and prevent its becoming a profitable concern.

An Improvement in the Manufacturing of Chandeliers, by the Crystallization of Salts upon their Frames.—FRANKLIN RANSOM, *Buffaloe, Erie County, New York.*

A PATENT was granted on the 13th of June last, to F. B. Merrill, of Buffaloe, for ornamenting the skeletons of chandeliers, &c. by immersing them in a saturated solution of alum, or other salt; chandeliers, so ornamented, being intended as cheap substitutes for those of cut glass. The present patent is obtained for the same thing precisely, and both the inventors, or discoverers, reside in the same town; which of them invented or discovered it first, or whether they discovered it originally in a chemist's laboratory or a lady's boudoir, we are not informed. Ornaments of this description were familiar objects in our boyish days, some time back, in the last century; although it had then been discovered that crystals would attach themselves to twigs interwoven in the form of baskets, grottoes, and pyramids,—the knowledge that sticks or wires, bent in the shape of the frame of a chandelier, was, it seems, reserved to become one of the notable improvements of the present day.

A new and useful Machine for winding up Clocks, called "Ward's Self-moving Power."—RICHARD WARD, *Waterbury, New Haven County, Connecticut.*

WITHOUT attempting a critical analysis of the name, "a self-moving power," which appears to us rather incongruous, we will at once proceed to a short description of the winding apparatus intended to be applied to a clock. Air, like other bodies, is expanded by heat and contracted by cold; it is proposed to use the expansion and contraction of this fluid, by natural changes of temperature, to keep a clock perpetually wound up.

An air chest, or reservoir, of the capacity of four or five gallons, it is estimated by the patentee, will be sufficient for a time-piece with a striking movement. A tube is to pass from this air-chest into a small gasometer, constructed with three concentric cylinders, precisely like those used for gases by the chemist. When the air expands in the chest, it is forced through the tube, and raises the middle cylinder of the gasometer, and when it contracts, the cylinder consequently falls. This cylinder is so suspended, that a cord or catgut, which passes over a pulley, turns a drum or barrel, and winds the clock, whether ascending or descending. The particular modes of effecting this, described by the patentee, we shall not detail; those conversant with machinery will be at no loss in perceiving how this may be done.

That a delicately made time-piece may be wound up by the expansion and contraction of fluids or solids from natural changes of temperature, is an admitted fact; but we will take this opportunity of making the following remarks upon the subject of the application of some of the moving objects in nature. Some of these may be employed to keep clocks and other engines wound up, so that their action shall be continued. The contractions and expansions of a long bar of metal, from changing temperature, the rise and fall of mercury in the barometer, the perpetual current of rivers, the flux and reflux of the tide, regular and irregular winds, and drafts or currents of air, the hygrometric changes in certain substances, are of the kind intended; the employment of some of them is familiar, and the possibility of using the whole of them, as well as some others which have not been enumerated, will be evident to most of our readers.

The possibility, and eligibility of a thing, are, however, very distinct questions; in machines for which patents are obtained, and which, of course, are expected to yield a profit to the patentee, the latter is the only point of importance; we apprehend that the present plan, like many of its predecessors, will fail to recommend itself by its actual utility, so as to repay the patentee for his expenditures of time and money.

An improved Cooking Stove. Joseph Hurd, jun. *Boston, Massachusetts.*

This improvement consists in the combination of a furnace and oven, partially or wholly surrounded by polished tin, or other metal, as reflectors; and a boiler which is set upon the oven, and is so constructed that it receives into a cavity, or chamber, at its bottom, the smoke and hot air from the furnace which previously passes around the oven.

Also the application of tin or other polished metal, to serve as a reflector around, or partially around, the furnace of a boiler, by means of which a great portion of that heat is saved, and applied particularly to objects for which it is wanted, which must be lost by radiation or absorption, when the fire is made on brick work or in common iron stoves.

Likewise the application of tin, or other polished metal, arranged around, or partially around an oven, which will reflect back upon it the heat which would otherwise be lost by radiation or absorption, according to the material made use of.

An Improved Boiler.—Joseph Hurd, jun. *Boston, Massachusetts.*

This improvement consists principally in having a chamber, or cavity, at the bottom of the boiler, which receives all the smoke and hot air from the furnace, and from which all external air is excluded. It has a flue, or pipe, through the side, to carry off the smoke into the chimney, or elsewhere.

We expect shortly to see the inventions to which the four preceding patents refer, in actual operation, and are prepared to place them on the list of real improvements; at all events they appear to be founded upon correct scientific principles, and we hope that the test of experiment may show that these principles are well applied. It is probable that a full account of them will hereafter appear in the Journal.

An improved Stereotype Plate.—Nathan Hale, *Boston, Massachusetts.*

The improved plate is intended for maps, and other subjects in which drawing and lettering are combined. Blank type, quadrats, or spaces, are to be cast of the usual height of type, so that when set up, they will stand even with the face of the letter. These are to be set by the compositor with the required names standing in their proper places; from this a block is to be cast in the usual way of forming stereotype plates, when the lines of the map, or other drawing, are to be formed by the graver.

The invention claimed as original consists of the union of the lettering and such parts of the cut as are formed by casting, with the blank parts of the same plate, having an even surface, on which other parts of the same map, or drawing, may be formed by engraving; and in an improved stereotype plate formed as herein before described.

REPORT

Of the Select Commitee of the House of Commons on the Laws of Patents.

(Continued from page 371.)

Mr John Farey again called in; and examined.

(Mr. *Farey.*) I was requested, on a former occasion, to illustrate my recommendation as to two kinds of successive specifications, by preparing some papers for the Committee, as a specimen of the process by which I proposed that patents should be granted. The paper I hold in my hand, is what I consider Mr. Watt ought to have communicated to the examiner in confidence, on his first application for his patent in 1768. For this paper I have adopted the words Mr. Watt afterwards used for his specification, but which in my opinion is not a specification, (not being specific.) That communication being rendered intelligible to the examiner, without his exercising any judgment on the value, merit, or practicability of the project, and being definitely worded, and divided into as many distinct articles as it admits of; and being also agreed to, and signed by the inventor, should be folded and indorsed by the examiner,

with a certificate signed by him, and the folded packet should be sealed by the inventor with his own seal.

That sealed packet being left in the possession of the examiner would form an accurate record of what had been communicated to him by the inventor.

A copy of the certificate that is indorsed on the packet should be given to the patentee by the examiner, as his title deeds of invention which he may assign; that copy should be on a printed sheet of instructions to the patentee, to inform him how to proceed, and what is the law on such points as he requires to know, at that stage of his application. I have put down the following articles as my first thoughts of what should be the chief points of law and regulation; but I wish it to be understood, that I present this paper only by way of illustration of the principles that I have recommended; and that I have not given the necessary time to study and consider the following articles so maturely, as to feel confident that I shall not see reason to alter and amend them at leisure.

Public notice should be immediately given of the application by advertisements in the Gazette, and in such of the principal newspapers as the examiner thinks most proper, in the districts where the trade to which the invention relates is most extensively practised.

If in consequence of such notice, any oppositions are offered, on the ground that it is not a new invention, or has been surreptitiously obtained, the examiner is to hear and decide upon them. If he requires to open the sealed packet for re-examination on such hearings, the applicant to have notice, that he or his agent may be present, and may seal it up again himself.

Within three months of the date of the deposit, the patentee must get his specification examined, completed, approved, and inrolled, so that it may be transcribed into the patent that it is to be granted with that date. But if he shews good cause, why he is not then prepared to specify, the examiner, at his own discretion, may grant more time, not exceeding three months, on condition that the patentee delivers an outline of what specification he proposes to give in, as soon as he can make it; also, making his election of those particular articles, together with the outline of the specification relating to them, to be made public; he shall then be protected against publications during the extended time; and the other secret articles he may withdraw.

And on shewing good cause why such additional time should be again extended, a further extension may be made, not exceeding twelve months more. The propriety of allowing such extensions, and the time of it, to be settled by award of asses-

sors; one appointed by the examiner, the other by the applicant; these assessors choosing an umpire, and proceeding on the principle of equitable arbitration between the public, and the inventor.

By way of example, I have sketched out the records of such proceedings as would have taken place on Mr. Watt's application, if the regulations that I recommend, had been then in force; and also I have drawn up, as an example for a specification, a brief description of the first steam engine that Mr. Watt did get to work properly about 1773.

Are you aware of the expenses which have been incurred on trials of patent rights?—I know them to be very expensive, and to amount, usually, to more than 600*l.* for each party. Mr. Daniell's costs in defending the *scire facias* by which his patent was set aside, was 750*l.* I have not preserved notes of the items of the expense of those in which I have been concerned, except of one which I before mentioned to the Committee; it was tried last January in the Court of King's Bench, on Clegg's patent for a gas apparatus; the patentee's costs amounted to 718*l.* for one trial, and the particulars, when summed up, are as follows:—

				£.	s.	d.
Counsel's Fees				172	17	0
Witnesses to facts, from the Country	£.98	14	6	237	10	6
Ditto Ditto in Town	10	4	6			
Scientific Witnesses, in support of the Specification	111	2	0			
Coffee-house expenses for Witnesses	17	9	6			
Office Copy of the Specification	15	16	0	17	19	4
Examining the same	2	3	4			
Expenses of collecting Evidence, including Subpœnas, journey to Leeds, Agents Charges, &c. about				40	0	0
Drawings				4	4	0
Court Fees				24	14	0
Proceedings in the Action, Special Jury, Briefs, Documentary Evidence, Letters, Attendances, &c. about				220	15	10
				£.718	0	8

The patentee obtained a verdict; but the above costs were taxed, and the infringer had only 432*l.* of them to pay, leaving the successful patentee much out of pocket; for, in addition to the above costs, several models and machines were constructed for the purpose of showing that all the machines described in the specification, would really operate as there described; and

also for the instruction of counsel, and to exhibit in court. The expense, I am informed was nearly 100*l.*

Will you explain how the necessity arose for so great an expense being incurred, in bringing up witnesses?—From the difficulty of explaining the subject to the court, in the manner that the law requires, and from the necessity of proving all the various facts which were unnecessarily called in question by the rule of law. The specification contained descriptions of several different distinct apparatus and machines to be used in concert, forming a complete gas apparatus for gas-lighting; every part of this apparatus was executed at first, and was then thought very advantageous; but the different parts of which it consisted, have gone out of use one by one, as they have been superseded by cheaper or better apparatus; the machines called the gas-meter and the governor, have been brought into very extensive use, and have proved valuable inventions, when executed in an improved form, by Mr. Crossley (who purchased the patent of Mr. Clegg, the inventor,) and who has established a considerable manufactory of gas-meters. It was for infringements on that part of the patent right, that the action was brought. The law requires the patentee to prove the novelty, the utility, and the sufficiency of the specification, for every one of the improvements described in the specification; hence it was necessary to give evidence respecting such apparatus as had been in use ten years before in different parts of the kingdom, but which has since been laid aside, and to prove their novelty, their success at the time, and the causes why they went out of use, that they were not positively deficient inventions at the time of granting the patent, though they have since been superseded by more modern improvements: hence the expenses were rendered very great, though the object when obtained was not great; viz. the trial of infringement respecting the gas-meter only. If the inquiry had been limited to that object, as it ought to have been, the expense would not have been so great. It should be remarked, that there was no needless multiplication of descriptions in that specification. I have before stated to the Committee, that during the time allowed for making the specification, in 1816, two varieties of the gas-meters were in progress, and we had only time to put one of the two to the test of actual working, before specifying, and therefore we described both, not knowing which would prove best. The experiments that were made within a short time afterwards, showed us, that one of them would have been better omitted, but that we could not foresee at the time of specifying. In every other part of the apparatus only one variety of each improvement is

described; and my descriptions were all from real apparatus that I saw made or in action, except that one gas-meter, which could not be got to work in time. The gas-meters that have since been brought into use, and were the subject of the action, are not constructed like either of those described, but are simplified. One inquiry was, if they were essentially the same invention, though constructed in a different form; it was proved to the satisfaction of the court, by numerous witnesses, that they were; and also that the gas-meters described would operate; hence the jury gave a verdict; and on motion for a new trial, the court confirmed the patent.

Do you conceive that the expense of that trial would have been much less, if instead of going before a judge and jury, it had been tried by a commission composed of scientific persons?—The expense would have been much less; but I am not recommending such a tribunal. A new tribunal supposes a new law, and I think that the expense might be equally reduced, if a good law were established, and the questions tried as at present. The inquiries should be confined to the points of invention really in dispute; the sufficiency of the specification being insured by previous examination, and improved specifications admitted. Competent scientific witnesses should be appointed by the court, to examine the subject at the joint expense of both parties, and then be called by the court, instead of by the interested parties. Some limitation should be made as to the time to which evidence against the novelty of the invention may be carried back, and previous notice of all the circumstances of such evidence should be given to the opposite party.

Why do you not recommend a tribunal of scientific men?—Because I fear that they would be very much influenced by feelings that do not exist in the present courts; such men would want weight and firmness to control the counsel, who would perplex, and overwhelm them with rules of proceedings, forms, and precedents. Many men of competent knowledge of their subject, and of the greatest integrity, are not competent to act as arbitrators in disputes, from want of such firmness. Even experienced judges, though they will not yield to counsel, cannot avoid losing much time from their attempts to support a losing cause by subterfuges. Men unaccustomed to see through such attempts, and who were not determined to repress them, would be quite incompetent to preside in a tribunal; they might do very well in a jury, but that would not diminish expense. There are also other difficulties; men of science would want the necessary practical knowledge of the arts which come in question during such trials, and they are very subject to be misled by their previous theoretic notions; and if

practical artists and manufacturers were substituted, then established prejudices of trades, and jealousies of rival traders, would come into operation.

From my experience in the proceedings of courts, I have not been inclined, of late years, to complain of the administration of the patent law, by judges and juries, when it becomes known what that law is, and when sufficient evidence has been tendered. What I see reason to complain of is, the obscurity of the law; the difficulty of knowing what it is; the manifest injustice of many of its provisions when expounded by the judges, who often acknowledge its hardships; and the excessive expense of stating a case in the form prescribed, so as to enable the court to really decide according to the law. My own opinion of the proceedings of courts during the last ten years is, that where a sufficient expense has been incurred in instructing counsel, and in bringing intelligent witnesses, and providing models so as to make the subject intelligible to the court they examine very patiently, and decide so as to leave no reason to complain of judges and juries, but continual reason to complain of the law, and particularly the want of statute law; for even if a bad law were enacted, and made clearly known, it would be an improvement, as suitors would know what to do, and when to keep out of courts.

It appears in the account that you have delivered in, that the expenses of one party to a trial amounted in one case, to 718*l.*; have you known cases which have cost considerably more?—Yes; to the amount of more than double and also to require a series of trials, or proceedings, so as to amount to thousands, before any decision was obtained. That account in Crossley's case is merely his expenses for one trial; he had previous proceedings in Chancery, and must have many more either to recover damages, or to repress infringements; that trial was only the question of right, a mere confirmation of his patent by the court of King's Bench.

Do you believe those cases had been managed with due consideration to economy?—Certainly not in all cases. I have sometimes had reason to suspect that expenses have been purposely augmented by one party, in order to deter and annoy the opposite party, for they must apportion their means of defence to those of the attack, or the means of attack to those of defence, and the taxed costs that are paid by the losing party, is always in some proportion to the real expenses incurred by the winner, whether properly incurred or not.

Does not the apprehension of such expense deter infringers from attempting to set aside patents, or defending themselves when actions are brought against them by patentees?—Certainly,

unless a combination can be made, to subscribe for the expenses, and then the managers of the suit have every motive to increase the expenses; and quite as often the expense deters, or absolutely prohibits patentees from proceeding, until they make up a combination, and a monopoly under their patents, to provide a subscription fund; they are often driven to that course exceedingly against their wills, as well as against their interest.

Are patentees aware of that?—Some are, some are not, most attornies understand it very well; but, in general, where a combination and subscription fund exists, whether to support or to overturn a patent, the other side is usually an individual, and he has scarcely any chance. I never knew a case of combination and subscription on both sides.

Do you conceive patentees are sometimes induced not to defend patents, from the expenses which may be incurred?—That is very often the case, combined with the uncertainty of the result. It is more common for patentees to endure denial of justice by the expenses, than for infringers, because the balance of that uncertainty is very greatly in favour of the latter, and their facilities of combination greater. I have known an infringer begin to defend an action brought against him by a patentee, and then set about forming a subscription to pay his expenses, but as it did not amount to money enough, he gave up, without having incurred any expense, and took a license under the patent just before the trial, for which the patentee had made expensive preparations.

So that the expense which is incurred by an action on a patent operates sometimes against the public, and sometimes against the patentee?—Decidedly so, but always in favour of combinations, whether of monopolists, or of piratical infringers.

Do you conceive that the case you have mentioned, in which an expense of 700*l*. was incurred, was conducted with a due regard to economy?—I know that it was managed at as little cost as could be done; the attorney inquired very particularly about my charge in that business, and I believe about others, though the patentee himself did not; the expenses were higher than ordinary, from the circumstances I before stated, of the number of points that were unnecessarily involved in the discussion, although only one was really in dispute.

Do you conceive that if a servant of an inventor, who is employed to make experiments for him, discloses his invention to the public, such disclosure will prevent the inventor obtaining a patent?—If it is publicly disclosed, it certainly would either induce the Attorney General to refuse the patent being granted, or it would be ground for setting the patent

aside afterwards. What constitutes a public disclosure has never been accurately defined; any sale from one person to another is an established criterion: and less than that will do, but how much less is undecided.

Would it be any defence to shew the court that the invention had been disclosed by the inventor to his servant, with the view of making experiments?—Certainly not; that is to say, the disclosure to the servant would be allowed, but a real publication by that servant would be held fatal. I suppose that such a servant would be liable to make compensation for the breach of trust, but yet he has a complete means of avoiding that remedy, for if he is bribed, or wishes to spite his master, he may get the publication made at second hand; for if he communicates the invention to a second person, and that second person goes and publishes it; there is no remedy against that second person; and the communication from the servant, which constituted the actionable breach of trust, was made in secret, and cannot be proved.

I knew a case of what might be termed a secret publication; a manufacturer had an invention which hé intended to keep secret, and not to take a patent for it; but a rival in the same pursuit having succeeded in attaining the result, applied for a patent; a law suit and quarrel existed between the parties at the time, for they had recently separated from partnership and had not settled accounts. To prevent the effect that this patent might have against the first named, he resolved to publish his invention, but he did that privately; for he sent a machine up to London, and set it to work before a number of people, who were told they might practise the invention, but it was so complicated that none were competent to understand or practise it, except a few who were servants, and agents of the publisher. If he had afterwards desired, from opposition or interest, to overturn his rival's patent, these competent persons would have been produced, to prove a real publication, but that was never attempted; and both parties went on working, until some years afterwards, when they made up the quarrel, and combined to prosecute others as infringers of the patent; it was then intended to prove in court, that the publication was a nullity, by calling only such witnesses as did not understand the invention when it was exhibited. The scheme failed and was abandoned before any trial, because the infringers had not followed the specification, but an improved machine, so different from it, that the patent could not be brought to bear against it, by any stretch.

About twenty years ago, some of the mechanists in Messrs. Marshall's flax mills at Leeds, invented the machine now gene-

rally used for heckling flax, preparatory to spinning; one of them applied for a patent for it, but was opposed by a Mr. Murray, who had been occupied with the same object. The Attorney General, being unable to find out the similarity that really existed, allowed the patent to pass; whereupon, before the date of the patent, Mr. Murray presented to the Society of Arts, the same model that he had exhibited in opposition.

So that in point of fact an inventor having occasion to employ persons to make experiments, has nothing to trust to but the good faith of those persons?—Certainly not; hence inventors almost always keep the secret to themselves, and continue in the dark, until they have got their patents. That this is the great reason why we see such a number of patents for absurd projects; the projectors usually find out their mistake within a short time after they disclose the secret, and hear what remarks are made upon it, often before they have made an actual trial, and many would then drop their patent, if they had not incurred almost all the expense of it, before they found out their delusion; I have continually advised patentees, who have brought old or absurd inventions to me, in order to make specifications to patents previously obtained, that it was not worth the trouble and expense of merely specifying, and they had better desist; but they have rarely done so, because of the expense they have incurred; and when I have urged the utter worthlessness of their patent if they did complete the specification, they have sometimes acknowledged it; but said perhaps they might nevertheless sell the patent to some one who did not know that fact.

In one of these cases an office copy of the specification I had made was afterwards sent to me by an attorney, to get my opinion on the goodness of the patent, and the value of the invention, for a client of his who was in treaty for the purchase; I knew the patent was good for nothing; but as I came by that knowledge in the course of confidential communication with the patentee, at the time of making his specification, I had no right, as a professional agent, to make use of that knowledge against his interests. On the other hand, as I might probably, by making search for the new party who asked my advice, have found out the same defect, even if the patentee had not previously communicated it, it was not right to conceal it. Under this embarrassment I took a middle course, and returned the papers, saying, that as I had prepared the specification, I must decline giving an opinion on what I had done myself; but as it was known that I make no such rule in other cases, the attorney at once suspected the fact.

One great object of the arrangements I have proposed in applying for patents, is to give the inventor every chance, if he is

under a delusion, of finding out his error, and abandoning his demand, before he has incurred a great part of the expense for a patent. I am confident that one half the patents now passed would be so withdrawn under the regulations I have proposed, although probably a double number of applications and deposits would be made.

Might not a part of the expense of trials on patent rights be saved, by calling on the parties to give notice to their opponents of the points on which they intend to rely in the course of the trial?—That would be of great importance, but would be rather difficult to enforce; because, although a patentee comes into court as plaintiff, on the infringement of his patent right, yet when defence is set up that his patent is bad he becomes in effect defendant thereof; hence it would be difficult to decide which party should give such notice. Patentees have constantly to prepare expensive evidence, and models, for points which are not ultimately called for by the court, and yet it cannot be foreseen what will be called for, and therefore every thing must be provided for the trial. I have not been called as a witness in a majority of cases in which I have prepared myself, and attended in court, after having put the parties to a considerable expense for models, and apparatus and assistants to make experiments, as well as for my own trouble; and other professional men whose attention had been directed to the same points with myself, have also been waiting in court at the same time, but have not been called. That was the case in Crossley's action, to which I have referred; there were several witnesses who had prepared themselves on particular points, but who were not called; and further, I and others who were examined, had been obliged to prepare to answer many questions that were not asked, and some felt deficient in knowledge of particular points on which they were examined, all for want of previous knowledge of what inquiry would be made; the expense would not have been so great, if effectual previous notice had been given of what points would be inquired into.

If an invention is discovered in a foreign country, a man may bring it over to this country and obtain a patent for it?—Yes, he may have a patent for "an invention communicated to him from a person residing abroad," provided such invention is not known or in use here.

Is that advantageous or otherwise?—Decidedly advantageous to us.

Why are you of that opinion?—From the fact that we have derived almost as many good inventions from foreigners, as have originated among ourselves. The prevailing talent of the English and Scotch people is to apply new ideas to use, and to bring

such applications to perfection, but they do not imagine so much as foreigners; clocks and watches, the coining press, the windmill for draining land, the diving bell, the cylinder paper machine, the stocking frame, figure weaving loom, silk throwsting mill, canal-lock and turning bridge, the machine for dredging and deepening rivers, the manufacture of alum, glass, the art of dyeing, printing, and the earliest notions of the steam engine, were all of foreign origin; the modern paper-making machine, block machinery, printing machine, and steam boats, the same; there are a multitude of others, that never have risen to any importance in the foreign countries where they were first imagined, because the means of executing and applying inventions abroad are so very inferior to ours. In almost all the above instances, we have so much improved and perfected what was brought into this country from abroad, that although they soon became important means of national wealth to us, the foreigners made little or nothing of them by themselves. Even after they got them back again in the improved state to which we had brought them, although they received their crude ideas matured, like children sent home, after having been well educated, and become full grown, by boarding for years, without expense, at a better school than home,—still they have not been able to set them to work so extensively and profitably as we have done. I am of opinion, that the appropriation to individuals for a time by patent, is essential to induce the necessary cultivation and training of foreign inventions to improvement; to effect their naturalization, or, as it were, to teach them the language of our nation; and also to insure the application of the crude ideas we may import from foreigners, to real use in business.

Do you not think that inventions for which patents have been taken out in a foreign country, would be almost sure to come into this country soon, without a patent?—Certainly; all knowledge will find its way into every country in time, but it is good policy to endeavour to accelerate the influx of foreign knowledge; I think that on the average of the operation of patent rights, they very greatly facilitate the establishment of new inventions to become branches of trade, as I have before explained, and I see no difference in any of those reasons, whether a new invention originates amongst us, or amongst foreigners. Even supposing there is no patent abroad, I conceive it puts our manufacturers under no disadvantage to be paying such a small tax as is usually levied by a patentee for licences, when foreign manufacturers may not be paying such a tax; because I feel confident of the fact, that under the stimulus and protection of a patent in Britain, the patentee, either by himself, or by men of talent who he can then afford to employ, will improve the

manufacture that is to be effected by the new invention, much more rapidly than can be done by the foreigners who are at work in the same course of improvement, without that stimulus, and with inferior means of execution; hence the tax the British patentee levies, will never be felt at all. If there is a patent abroad to stimulate corresponding exertions to improvement there, then the foreign manufacturers will be under a corresponding tax; but such taxes are in all cases a mere trifle, compared with the profits that manufacturers derive from the adoption of new inventions. It is obvious that we should not get even the bare idea of a new invention so soon, if we do not offer to grant a patent for it, as with that premium or bounty for its importation; also that in the latter case it will come to us in the most complete form that it has acquired abroad. When we do get an idea completely without a patent right, it is of no use for any one to incur the expense of cultivating it. The policy of granting the exclusive privilege for a foreign invention, stands on precisely the same ground as that for any other first idea. I can say, from long experience, that the new inventions we get fresh imported from abroad, are to the full as crude, and in as much need of future expensive cultivation, as any of the secret productions of our own inventors, when they first disclose them. I conceive, that in all cases, the operation of patent law is advantageous to the cultivation of first ideas, up to that point of practicability when they can be established as articles of trade and commerce; and also, after that perfection of invention is attained, the operations of trade, founded on new inventions, are very much facilitated by some person having an interest to devote all his energies to that trade, to create an extensive demand, and organize the means of supplying the same. The public usually come into practice in that new trade (under a trifling tax), as soon as ever they please, and if good laws were enforced, they would always acquire a complete right and possession at the expiration of the patent; not merely of the bare notion of how they might go to work to establish a new trade, but they would be put in full possession of an organized trade, which they would never have acquired in such perfection at all until a later period, if its cultivation towards perfection as an art, and establishment as a trade, had been left to the languid and desultory exertions of every one who might choose to do a little, *con amore*, without any exclusive benefit. Independently of mere pecuniary interest, men of genius are greatly stimulated to exertion, by the hope of having a right of property in, and control over, their own productions; for the same feeling exists that they have towards their children; and the absence of that confidence of property and right, induces

the same capricious, negligent, unconnected, and casual attempts at cultivation of new ideas or inventions, as is observable in men with the education and advancement of their children, whe the legitimacy is doubtful.

Supposing an article patented, and actually brought into efficient use abroad, is there any benefit to this country in allowing persons to introduce an article in that state, amd to have a patent for it?—Supposing the invention to be already as perfect as we could make it, there would be little advantage in allowing a patent for it, except that as it still requires to be made known, and brought into use amongst us, in spite of ignorance and prejudice, that bringing into use will be accelerated by the exertions of a patentee; nor do I see any equivalent disadvantage in granting a patent, because I know the taxes, levied by patentees, are always so slight.

Might not the public be benefited, by using it without a patent?—They would not get it into use so speedily without a patent, even if it were imported in a stage of high perfection as to invention, because there is a prejudice against the adoption of all new practices, that must be overcome; a patentee will labour to get over that for his own interest; but every successive importer who has adopted a new invention from abroad, without a patent, will of course keep it a secret as long as he can, and will disguise and deceive as much as possible, by saying, "that the invention which he got from abroad (and which others may get), proved good for nothing; he lost money by it, and it only served to set him to work on the subject, and he has made a new invention;" such false statements will pass current, and retard the adoption a long time. If we suppose the British patentee of a foreign invention, wished to keep it in his own hands, and would not grant licences, then that must be because he has means of supplying the public demand very freely, or else that exclusion would be destroying his own property.

It must not be overlooked, that the assumption of the invention being very perfect when it is first imported here, implies that it has been a long time in existence, and has been long cultivated in secret by foreigners, because they are so much slower at such work than we are: if we had offered the premium of a patent right for its early importation amongst us, there is every probability that we should have received it years before, in a crude state; either from the inventor himself, when it was in its earliest stage of infancy, if he kept it secret, or else from commercial speculators, if it were openly known. Having thus obtained the crude invention, we should have set our great means and powers to work on its perfection and cul-

tivation, at the same time as the foreigners began, and they would then have had no chance with us, to have attained the same perfection in the same time. I could cite many cases in support of these opinions.

List of Patents

GRANTED IN SCOTLAND SINCE SEPTEMBER, 1829.

(*Continued from* Vol. V. p. 114.)

For certain improvements on or additions to fire places. To Joseph Ange Fonzi, Esq. county of Middlesex.—Sept. 23.

For certain improvements in the construction of cannon. To John Tucker, county of Middlesex.—Sept. 23.

For certain improvements in apparatus to be applied to fowling pieces and other fire arms in place of locks. To David Laurence and John Crundwell, county of Kent.—Sept. 23.

For a new process or method of whitening sugars. To Joshua Bates, city of London.—Sept. 25.

For an improved method of constructing steam boilers or generators, whereby the bulk of the boiler or generator and the consumption of fuel are considerably reduced. To Joshua Bates, city of London.—Sept. 25.

For certain improvements in diminishing friction in wheeled carriages to be used on rail roads, and which improvements are applicable to other purposes. To Ross Winans, county of Sussex.—Oct. 28.

For a certain improvemeut or improvements in distillation To William Shand, Esq. county of Kincardine.—Oct. 28.

For certain improvements in the construction of anchors. To William Rodger, county of Middlesex.—Nov. 3.

For certain improvements in the process of manufacturing soap. To Charles Turner Sturtevant, county of Middlesex.—Nov. 6.

For certain improvements in machinery for spinning cotton and other fibrous substances. To Charles Brook, county of York.—Dec. 17.

For a new preparation or manufacture of a certain material produced from a vegetable substance, and the application thereof to the purposes of affording light, and for other uses. To James Soames, jun. county of Middlesex.—Dec. 17.

For an exploding shot or projectile. To John Tucker, county of Middlesex.—Jan. 25. 1830.

For a new alloy or compound metal applicable to the sheathing of ships and various other useful purposes. To John Revere, New York.—Feb. 2.

For a machine or hydraulic engine for applying the power or pressure of water, steam, or other elastic fluids to the purpose of working machinery and other uses requiring power, and applicable to that of raising or forcing fluids. To Edward Dakeyne and James Dakeyne, county of Derby.—Feb. 2.

For an improvement in ships' windlasses. To George Straker, county of Durham.—Feb. 8.

For an improvement in the manufacture of canvas and sail cloth for the making of sails. To James Ramsay and Andrew Ramsay, Greenock.—Feb. 9.

For an improved mechanical power applicable to machinery of different descriptions. To Thomas John Fuller, county of Middlesex.—Feb. 13.

For certain improvements on, or additions to, wheels or apparatus for propelling vessels and other purposes. To Anton Bernhard, county of Middlesex.—Feb. 16.

For an improved method of manufacturing salt. To John Braithwaite and John Ericsson, London.—Feb. 19.

For an improvement in the apparatus used for distilling. To Patrick Dawson, Lillyburne.—Feb. 26.

For certain improvements in apparatus used for distilling and rectifying. To Robert Busk, county of York.—Feb. 26.

For the manufacture or preparation of certain substances which he denominates the British tapioca, and the cakes and the flour to be made from the same. To John M'Innes, Esq. of Stirling.—March 3.

For certain improvements in the construction of window frames, sashes, or casements, sun-blinds, shutters, and doors designed to afford security against burglars, as well as to exclude the weather.—To Andrew Smith, county of Middlesex.—March 16.

For certain improvements in apparatus and machinery for cleansing and deepening rivers, and in the method of applying the same. To Thomas Affleck, Dumfries.—March 16.

For certain improvements in machinery for spinning cotton, silk, linen, and other fibrous substances. To James Carrick, Esq. county of Lancaster.—April 13.

For certain improvements in making or manufacturing bolts or chains. To Samuel Brown, Esq. London.—April 29.

For certain improvements in the means of keeping or preserving beer, ale, and other fermenting liquors. To William Aitken, Esq. Scotland.—April 29.

For certain improvements in apparatus for making and supplying coal gas for useful purposes. To Richard Witty, county of Stafford.—May 3.

For certain improvements on steam boilers and in carriages or apparatus connected therewith. To James Viney, Piccadilly.—May 12.

For a new method of purifying and whitening sugar or other saccharine matter. To Edward Turner, county of Middlesex. —June 14.

For an improved engine for communicating power for mechanical purposes. To John Ericsson, London.—July 21.

For certain improvements in preparing or finishing piece goods made from wool, silk, or other fibrous substances. To John Frederick Smith, Esq. county of Derby.—July 29.

For certain improvements on steam carriages and in boilers, and a method of producing increased draft. To John Rawe Junior, county of Middlesex—July 29.

For an improvement or improvements in the method or apparatus for separating the knots from paper, stuff, or pulp, used in the manufacture of paper. To Richard Ibotson, county of Middlesex—August 3.

For certain improvements on, and additions to, machines or machinery to be used and applied for conducting to and winding upon spools, bobbins, or barrels, rovings of cotton, flax, wool, or other fibrous substances of the like nature. To Joseph Cheeseborough, county of Lancaster.—August 19.

For a method or process of giving a metallic surface to cotton, silk, linen, and other fabrics. To John Yates, county of Chester.—August 19.

For a new method of making iron wheel barrows of wrought iron, with a wrought iron wheel, by which new method, said iron wheel barrows can be made lighter, stronger, more durable, and cheaper than any iron wheel barrows which have been heretofore in use. To William Mallet, Dublin.—August 19.

For an improved machinery for the navigation of vessels and propelling of carriages. To John Ruthven, Edinburgh.—September 6.

New Patents Sealed.

To Charles Derosne, of Leicester Square, in the county of Middlesex, gentleman, in consequence of a communication made to him, by a certain foreigner, residing abroad, and invention by himself, for an invention of certain improvements in extracting sugar or syrups from cane juice and other substances, containing sugar, and in refining sugar and syrups.—Sealed 29th Sep. 2 months, for Inrolment

To Michael Donovan, of the city of Dublin, for his invention of an improved method of lighting places with gas.—6th Oct. 6 months.

To Lieutenant Colonel Leslie Walker, C. B. of Cumming Street, Pentonville, for his invention of a machine or apparatus, to effect the escape and preservation of persons and property in case of fire, or other circumstances. —6th Oct. 6 months.

To Richard Pering, of Exmouth, in the county of Devon, Esq. for his having invented an improvement or improvements on anchors.—6th Oct. 6 months.

To John Heaton, William Heaton, George Heaton, and Reuben Heaton, of Birmingham, in the county of Warwick, manufacturers and copartners, for their having invented or found out certain machinery, and the application thereof to steam engines, for the purpose of propelling and drawing carriages on turnpike roads, and other roads, and railways.—6th Oct. 4 months.

To Joseph Harrison, of Wortley Hall, in the parish of Tankersley, in the county of York, gardener, and Richard Gill Curtis, of the same place, glazier, for their having invented certain improvements in glazing horticultural

and other buildings, and in sash bars and rafters.—6th Oct. 2 months.

To John Dickenson, of Nash Mills, in the parish of Abbotts, Langley, in the county of Hertford, Esq. for his having invented or found out an improved method of manufacturing paper by means of machinery.—6th Oct. 6 months.

To William Augustus Archbald, of Vere St. Cavendish Square, in the county of Middlesex, gentleman, for his invention of an improvement in the preparing or making of certain sugars.—13th Oct. 6 months.

To David Napier, of Warren Street, Fitzroy Square, in the county of Middlesex, engineer, for his having invented certain improvements in printing, and in pressing machinery, with a method of economising the power applicable to the same; which method of economising power is also applicable to other purposes.—13th Oct. 6 months.

To Francois Constant Jacquemart, of Leicester Square, in the county of Middlesex, Esq. in consequence of a communication made to him, by a certain foreigner residing abroad, for an invention of improvements in tanning certain descriptions of skins.—20th Oct. 6 months.

To Joseph Budworth Sharp, of Hampstead, in the county of Middlesex, Esq. and William Fawcett, of Liverpool, in the county palatine of Lancaster, civil engineers, for their having invented or found out an improved mode of introducing air into fluids, for the purpose of evaporation.—20th Oct. 6 months.

To Alexander Craig, of Ann Street, Saint Bernard's, in the parish of Saint Cuthbert's, and county of Mid-Lothian, in consequence of a communication made to him by a certain person residing abroad, for an invention of certain improvements in machines or machinery, for cutting

timber into veneers, or other useful forms.—20th Oct. 6 months.

To Andrew Ure, of Burton Crescent, in the county of Middlesex, doctor of medicine, for his having invented an apparatus for regulating temperature in vaporization, distillation, and other processes.—20th Oct. 6 months.

To Andrew Ure, of Burton Crescent, in the county of Middlesex, doctor of medicine, for his having invented an improvement or improvements in curing or cleansing raw or coarse sugar.—20th Oct. 6 months.

To Andrew Ure, of Southampton Row, in the county of Middlesex, doctor of medicine, for his having invented an air stove apparatus for the exhalation and condensation of vapours.—20th Oct. 6 months.

To Samuel Clerk, of South Down, Brixham, in the county of Devon, for his having invented certain improvements in making or preparing saddle lining, saddle cloth, and girths, for keeping saddles in place on horses, and other animals of burden.—20th Oct. 6 months.

To Sir Thomas Cochrane, Knight, (commonly called Lord Cochrane,) of Regent Street, in the county of Middlesex, for his having invented an apparatus to facilitate excavating, sinking, and mining.—20th Oct. 6 months.

To Timothy Mason, of Great Portland Street, in the county of Middlesex, brush maker, for his having invented or found out an improvement in the manufacture of painting brushes, and other brushes applicable to various purposes.—20th Oct. 6 months.

To Samuel Clegg, of Sidmouth Street, Gray's Inn Lane, in the county of Middlesex, civil engineer, for his having invented or found out an improved gas meter.—20th Oct. 6 months.

CELESTIAL PHENOMENA, FOR NOVEMBER, 1830.

D.	H.	M.	S.	
1	0	0	0	☉ before the Clock 16 *m.* 15 Sec.
1	3	0	0	☾ in conj. with f in Taurus
1	22	0	0	☾ in conj. with γ in Taurus
1	23	0	0	☾ in conj. with 1 θ in Taurus
1	23	0	0	☾ in conj. with 2 θ in Taurus
2	4	0	0	☾ in conj. with α in Taurus
5	0	0	0	☉ before the Clock 16 *m.* 15 Sec.
6	22	53	0	☾ in □ last quarter
7	10	0	0	♀ in conj. with λ in Virgo
8	12	0	0	☾ in conj. with ρ in Leo
9	2	0	0	☿ in conj. with κ in Virgo
9	13	0	0	☾ in conj. with σ in Leo
10	0	0	0	☉ before the Clock 15 *m.* 56 Sec.
10	4	0	0	☿ in conj. with λ in Virgo
10	4	0	0	☾ in conj. with β in Virgo
10	20	0	0	☾ in conj. with η in Virgo
11	7	0	0	☾ in conj. with 1 γ in Virgo
1[illegible]	22	0	0	♀ in conj. with 2 α in Libra
15	1	55	0	Eclip. conj. or ● new moon
15	7	0	0	♀ in conj. with 2 α in Libra
16	0	0	0	☉ before the Clock 15 *m.* 4 Sec.
16	5	0	0	☽ in conj. with φ in Oph
19	12	0	0	☽ in conj. with d in Sagitt
20	0	0	0	☉ before the Clock 14 *m.* 13 Sec.
21	14	0	0	☿ in conj. with ♀ Long. 20° in Libra
21	14	0	0	☿ lat. 25° N. ♀ lat. 48° N. diff. of lat. 23'.
22	6	37	0	☉ enters Sagitt
22	23	44	0	☽ in □ first quarter
23	9	0	0	♀ in conj. with κ in Libra
23	15	0	0	☽ in conj. with λ in Aquarius
23	21	0	0	♀ in conj. with κ in Libra
24	1	0	0	☽ in conj. with φ in Aquarius
25	0	0	0	☉ before the Clock 12 *m.* 51 Sec.
25	0	0	0	☽ in conj. with ♂ long. 28° in Aquarius ☽ lat. 1° 55' S. ♂ lat. 46 S. diff. of lat. 1° 9'
25	2	0	0	♀ in conj. with λ in Libra
26	2	0	0	☿ in conj. with λ in Libra
26	18	0	0	☽ in conj. with ν in Pisces
27	0	0	0	♀ in conj. with 1 and 2 β in in Scorpio
27	20	0	0	☽ in conj. with μ in Ceti
28	10	0	0	♀ in conj. with 1 and 2 β in Scorpio
28	14	0	0	☽ in conj. with f in Taurus
29	9	0	0	☽ in conj. with γ in Taurus
29	10	0	0	☽ in conj. with 1 θ in Taurus
29	11	0	0	☽ in conj. with 2 θ in Taurus
29	15	0	0	☽ in conj with α in Taurus
29	15	0	0	Ecliptic opposition or ○ full moon.
29	16	0	0	♀ in conj. with ν in Scorpio

The waxing moon ☽.—the waning moon ☾

METEOROLOGICAL JOURNAL, FOR SEPT. AND OCTOBER, 1830.

1830.	Therom.		Barometer.		Rain in inches.	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
SEPT.											
26	61	38	30,26	30,09	0,75	11	58	39	30,33	30,30	
27	61	35	30,28	stat.		12	58	46	30,26	stat.	
28	64	48	30,16	30,08		13	58	41	30,30	30,26	
29	56	46	29,96	stat.	,2	14	57	39	30,26	30,20	
30	57	37	29,99	29,98		15	55	29	30,16	30,14	
OCT.											
1	60	33	30,02	stat.		16	58	27	30,19	30,16	
2	61	46	30,02	stat.		17	57	27	30,30	30,25	
3	61	55	29,96	29,93	,075	18	54	34	30,23	30,16	
4	63	49	30,23	30,03		19	61	49	29,96	29,95	
5	59	42	30,30	stat.		20	69	46	30,05	29,95	
6	57	39	30,30	30,26		21	67	46	30,16	30,06	
7	62	43	30,32	30,26		22	67	46	30,19	stat.	
8	65	41	30,40	30,36		23	58	51	30,39	30,26	,025
9	60	48	30,44	30 ,42		24	57	44	30,39	30,29	
10	63	43	30,44	30,40		25	60	42	30,05	29,86	

Charles Henry Adams

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXIII.

[SECOND SERIES.]

Original Communications.

ART. III.—To T. B. LENNARD, ESQ. M. P. CHAIRMAN OF THE LATE COMMITTEE UPON PATENT-LAWS.

SIR,—The re-assembling of Parliament naturally excites the attention of the various classes of the community to the anticipated measures directly bearing upon their several interests. Of those interests you had more immediately chosen as the subjects of your attention in the last Parliament, the urgent claims of the great body of scientific and mechanical men throughout the united empire engaged in the prosecution of inventions and new discoveries, and the means of affording them relief from the vexations and oppressions of the present system of patents under the seals.

You stood forward with every appearance of zeal and determination, the avowed champion of a large and most valuable portion of society—than whom none more justly demanded and more directly claimed the interference

of the legislature on their behalf. Interspersed throughout the innumerable ramifications of the arts and manufactures of the country—thousands hailed the approaching dawn of an improved system, that should give renewed energy to their intellectual pursuits, and that should cover the operative results of their mental creations with the broad ægis of *real protection*—of direct efficient security—of safe and available means of protecting and opening to the public service the entombed and immeasurable resources of the inventive talents of the community. How these just claims—these cheering anticipations—have been realized, the sequel of this address will shew.

In the session of 1828-29, you obtained in the Commons the appointment of a Select Committee, " to enquire into the present state of the law and practice relative to the granting of patents for inventions, *and to report their observations thereon to the House.*" It is essential to bear in mind the obligation imposed upon the Committee, by their appointment—*to report their observations* upon the state of the law and practice to the House. Without such a a Report, which necessarily would include *their views* as to the nature and extent of the remedies to be applied, the enquiry itself would not effect any beneficial result—it could only elicit the conflicting views of parties examined and an heterogenous mass of evidence—upon which the House itself could not arrive at any conclusion so as to adopt the remedial measures, the necessity of which is implied by the actual appointment of a Committee of enquiry.

The Committee met and prosecuted the delegated enquiry with unremitting attention, and with the application of a rare union of talent, and the most patient investigation. The result of their preliminary labours reflected the highest credit upon their united exertions, and pro-

portionately raised the most intense anticipations of the benefits that would eventually result to the public, from the continuance and final completion of their laborious and most interesting duties. They presented at the close of the session a voluminous mass of evidence and documents to the House, accompanied with a short interlocutory Report, in which they allude to "the intricate and important nature of the subject" referred to them, and state that "at the present late period of the session they are *only* prepared to report the minutes of the evidence taken before them, together with the several documents; *and they earnestly recommend to the House, that the enquiry may be resumed* EARLY *in the next session.*" A more sensible and explicit statement of the views of the Committee, *as to the necessity* of continuing this important enquiry, and a more distinct pledge of their willingness to resume their meritorious labors, could not have been framed by any combination of language.

As a darkened contrast to this most excellent and welcome announcement, we find that the next session has been allowed to pass without a resumption of the enquiry according to the *earnest* recommendation of the Committee—and that no measures whatever were taken during the entire session in accordance with the directions of the House—that the Committee should report *their observations* upon the present state of the law and practice relative to patents for inventions. The efficient and practical object of their appointment has been delayed, (if it be not finally defeated) by the non re-appointment of the Committee; a discordant chaotic mass of elements—of conflicting judicial decisions—of jarring opinions—of opposing interests—of undigested schemes—and beyond all other "intricacies"—the treacherous dealings with mens' rights in the highest quarters by those who "have the

ear of a person about his Majesty;"*—"the one hundred guineas given for signing one paper before another,"—each of and all these important matters required the re-appointment of the Committee as an imperative obligation, equally as it respected their individual character, and the rights of abused and oppressed inventors.

Without a resumption of the enquiry, the publication of the evidence and documents has only tended to increase the widely extended dissatisfaction which prevailed before men knew the amount of the frauds, and impositions, and wrongs to which they were subjected by this most iniquitous system.

Allow me, Sir, to ask with the respect due to a public character, but with the feelings of a man deeply interested in the redress of this wretched system of immeasurable ill—Why you, as Chairman of the Committee, should have suffered the whole of last session to pass away without moving for its re-appointment, according to its *earnest recommendation? You* are particularly called upon to satisfy the public as to this loss of an entire session, because, if I am rightly informed, it is the official duty of a Chairman, to move for the re-appointment of his Committee, when such re-appointment is reported to be expedient; no other member could, according to the established etiquette, take the business out of your hands. You were therefore bound, both in regard to the character of the Committee, *especially after the evidence they have published,*—and what is of greater importance—the claim of the public, to have the directions of the House complied with—to have moved the re-appointment of the Committee. The reasons why you have not so done, ought to be stated in Parliament. The proceedings of the Com-

* Vid. Mr. Rotch's Evidence.

mittee are stultified—the motive and object of their appointment are rendered abortive, and the galling injuries of the present system have been unnecessarily continued for another year—by the non-reappointment of the Committee, and by their not having complied with the essential practical intention of their appointment—"the Report of *their observations* on the law and practice to the House."

Allowing your utmost claim for ability and good intention, it is impossible, amidst the collision of views and the discrepancies which the reported evidence and documents present, that any individual, however gifted, can arrange and present to Parliament that complete system of amelioration, which "the intricate and important nature of the subject" demands.

The united abilities and matured judgment of a Committee are absolutely required for the production of that well organized plan of amelioration, which shall relieve the inventive talents of men from the anomalies, uncertainties, insecurity, *expense and insidious dealings*, to which they are still subjected, by the continuation of patents under the seals. Nothing short of an entire new and broad system *of real protection* will satisfy the claims of inventors, and open to the country the infinite resources in aid of its commerce and manufactures which are now bound under the accumulated weight of great and little seals, jobbing sign-manuals, and Chancery formula.

The task is too gigantic for any single hand; your direct and parliamentary course is still to move for the immediate re-appointment of the Committee, in order "to report *their observations* on the evidence," and to present *their* plans of amelioration to the House. This course will alone fulfil the object and end of their original appointment.

I am, Sir, yours, &c. &c.

Nov. 1830. VINDICATOR.

Recent Patents.

To Thomas Prosser, *of the city of Worcester, Architect, for his invention of certain improvements in the construction of window sashes, and in the mode of hanging the same.*—[Sealed 6th of March, 1830.]

These improvements are designed to enable sash windows to be readily turned inside out for the greater facility of cleaning the glass, without the danger attendant upon getting on the outside of the window for that purpose; and also to exclude the wind and rain in a more perfect manner than can be effected by the ordinary constuction of window frames and sashes. The following is the Patentee's description of this invention:—

SPECIFICATION.

"My invention of certain improvements in the construction of window sashes, and in the mode of hanging the same, are applicable to that description of window sashes which are hung or suspended from cords, and slide up and down in their frames, and are intended to render the sash windows more securely weather tight, so as to keep out wind and rain; by these improvements I am enabled to make sash windows of a more simple construction than those in common use.

"These improvements also consist in a peculiar mode of hanging or suspending the sashes, which will allow of their being turned inside out, for the purpose of more readily getting at the outside, (or that part which is exposed to the weather) of both the upper and lower sash, and by which either or both of the sashes may easily be removed from, or out of the window frame.

"That part of my invention by which I am enabled to form a better weather tight joint than heretofore, used in sashes of the common construction, consist of projecting ribs or tongues on the sides of the frames of the window, which ribs or tongues fit into grooves in each side of the sashes, and thus exclude the weather in a more perfect manner, and at the same time serve as guides for keeping the sashes in their places, as they slide up and down in the window frame. The ribs or tongues extend the whole length of each sash, but those belonging to the lower or inside sash are made to slide in grooves extending from the top to the bottom of the window frame, for the purpose of allowing them to be raised up to the top part of the window frame, and out of the groove in the sash, so as to allow of the sash being turned inside out, for the facility of more readily getting at the outer side; and this movement of the rib or tongue belonging to the sash, will allow of the same operation being performed on the upper sash when it is pushed down to the bottom of the window frame. The lower sash being previously raised with its projecting rib to the top of the window, there will be nothing projecting beyond the flat side of the window frame to obstruct the upper sash from being turned inside out.

"Another part of my improvement is in the manner of hanging the sashes, and consists of a peculiar mode of attaching, or connecting the sashes to the sash lines, or suspending cords, which mode of connection will allow of the sashes turning in the joint, or point of suspension freely, but without disuniting the sash from the suspending cord; and also allows of either or both the sashes being disunited from the sash lines, and removed out of the window frame.

"My improvements also consist in the hanging or sus-

pending both sashes from one sash line or cord, so that the weight of one sash will balance the other, by which I am enabled to dispense with the double cord pullies, and the sash weights used in the windows of the common construction. All of which improvements will be better understood by the drawings hereunto annexed, and the following description thereof; the same letters of reference referring to similar parts in all the figures.

" Plate V, fig. 1, is a front view of a window frame and sashes complete, as they appear when closed. Fig 2, is a section taken vertically through the same. Fig. 3, is a front view of a window, with the sashes partly opened. Fig. 4, is a section of the same. Fig. 5, is another front view of a window with the sash turned inside out. Fig 6, is a section of the same. Fig. 7, is a section, taken horizontally through the window frame; and fig. 8, is another section, taken vertically through the same; but, with the sashes removed for the purpose of shewing the grooves, and projecting ribs or tongues; *a, a, a, a,* is the frame work of the window; *b,* is the upper sash, and *c,* the lower. These sashes are suspended from the lines, or cords, by a peculiarly formed joint at *d, d,* described hereafter; *e, e,* are the projecting ribs or tongues on the sides of the window frames, which are inserted into the grooves *f, f,* in the lower sash *c,* by which a weather tight joint is formed, when the window sash is shut down. These ribs also serve as guides to keep the sash in its place, as it slides in the frame of the window, and prevent the rattling or shaking of the sash.

" The rib of the lower sash *e, e,* is made to slide up and down in a groove *g, g,* in the side of the window frame *a, a,* and has small springs *h, h,* (see figs. 9 and 10,) which are detached views of the projecting rib or tongue, when taken out of the frame affixed at the back, for the purpose of keeping it in the groove *f.*

"When the bottom sash *c, c,* is to be turned inside out, the rib *e,* is to be raised up to the top of the window frame, sliding in the groove *g,* (see figs. 2 and 8), and the sash pushed down to the bottom of the window frame, when the rib being out of the way, the sash will be allowed to turn freely on the suspending joints *d, d.* When the upper sash is to be turned, the lower one is to be raised up to the top of the window, with its projecting rib, and the upper sash *b, b,* to be lowered to the bottom of the window frame, leaving its rib, which in this instance is fixed to the side of the window frame, and will now be free to turn on its pivots at *d, d.*

"In all the foregoing figures, the sashes are shewn, both connected to one suspending cord or sash line *h, h,* which is passed over a pulley *i,* turning on bearings in the side frame of the window, and as one sash is raised the other will be lowered, their movements being simultaneous.

"When the sashes are to be made so as to turn on the point of suspension, and also allow of their being taken out of the window frame, I use the following mode of connecting them to the sash lines or suspending cords: on the end of the sash line *h,* is firmly attached the piece of iron or other metal *k,* having a slot or eye in it (shewn more particularly in the detached figures 11, 12, 13,) which piece with the cords move up and down in the grooves *z, z,* in the side frame of the window; on the side of the sash frame is the projecting stud or pivot *m,* having its end formed into the shape of a T, and which stud is to be introduced into the slot in the piece *k,* and when put together, as shewn in fig. 7, the connection is complete, and the sash will be allowed to turn on the pivot in the slot of the suspending piece *k,* without danger of their being disunited, the groove *l, l,* keeping the union com-

plete; the cord and suspending piece being in the groove and out of the way of the sash as it is turned.

"When it is desired to take one or both of the sashes out of the window frame, the sash is to be turned into the horizontal position, and either side of it raised up, and the cord taken out of the groove *z*, when it can be disunited from the suspending piece *k*, and on the other end being taken out of the other groove, it can also be disunited from the sash, which is now free to be taken away. On putting a sash into the window frame again, one of the suspending pieces are to be connected to the pivot, and put into the groove, then the other cord is to be attached to the other stud, and put into its groove, and lowered to the horizontal position; it may then be turned into its proper position in the window frame.

"Should the suspending cords or sash lines, at any time become stretched and require shortening and adjusting, I use the following mode of effecting that object: a part of the side frame of the window in which the pulley *j*, is mounted, is made to take out, and with it the pulley and sash line, as shewn in the detached figs. 14, and 15; *i*, is the pulley before mentioned, which turns in its bearings in the piece *p*; on this piece *p*, is a dovetail piece, which fits into the groove in the piece of the side frame *n*; on the bottom of the piece *p*, is the adjusting screw *r*, the head of this screw rests on the solid part of the side frame *a*, when the sashes are in the window frame, and on turning this screw round, the pulley can be raised or lowered in its position as regards the sashes; the piece *p*, sliding in the groove in the piece *q*, and thereby keeping the joint always in the frame work closed.

"Having described particularly the construction of my improved sashes, and the manner of hanging or suspending the same, it only remains for me to remark that when

both sashes are hung or suspended from one cord only, and which are not intended to turn on their points of suspension, the peculiar mode of connecting them to the sash lines as described may be dispensed with, and the cords attached in the usual way; but when the sashes are to be constructed, so as to take out of the window frame, then I recommend that the last described method should be used.

"When it is desired to hang or suspend sashes independently of each other, and which are intended to turn on their points of suspension, the sash lines or cords may be passed over pullies in the side frames of the window, and balance weights connected to their ends, as in sashes of the common construction.

"I wish it to be understood, that I do not mean or intend to claim as a part of my invention, simply constructing sashes so as to turn on pivots or centres, as I am aware that they have been so made and constructed before. But I do claim as my invention, the peculiar method of hanging or suspending them to the sash lines or cords by the joints or connections herein described, so as to allow of their being disunited without taking out any part of the window frame, and which also allows of their turning freely on their centres. And also the manner of hanging or suspending both sashes from one sash line or cord, and in the manner of adjusting the same. And also in the application of the projecting ribs or tongues, for the purpose of forming a more weather tight joint than heretofore used, and in the making or constructing of the same, so as to slide out of the way when the sashes are to be turned inside out.—[*Inrolled in the Roll's Chapel Office, September,* 1830.]

Specification drawn by Mr. Berry.

To Henry Pinkus, *of Thayer Street, Manchester Square, in the county of Middlesex, Gentleman, and* James Collier, *of Newman Street, Oxford Street, in the same county, Civil Engineer, for their invention of an improved method, and apparatus for generating gas for illuminations.*—[Sealed 5th of April, 1830.]

SPECIFICATION.

"The several parts of our 'improved method and apparatus for generating gas for illumination,' consist, First, in an improved compound material, the object of which is the more convenient use of certain resinous bitumen, such as common rosin, pitch, or Archangel or Stockholm tar, or a solution of any of these with coal tar; to these are added sugar, or molasses in quantity and manner hereinafter described; or other combustible matter having similar properties. These, in decomposing by a red heat with the bitumen, prevent the formation or developement of a certain acid, by the action of its oxygen; which acid would act on the metal of the retorts, and is exceedingly detrimental to them. Secondly, in effecting such neutralization by means of admitting into the retort when in action, an excess of ammoniacal or hydrogen gas. Thirdly, in passing the fluid material to be decomposed, first, through strong metal tubes called generators, in which it is kept under strong pressure, either by means of a force pump, or a high column of the fluid, which fluid becomes heated to a high degree of temperature, and is rendered thinner before it is admitted into the retort, into which it is injected in small streams or sprays, by the action of a force pump, or its expansibility by the absorbed heat. Fourthly, in combining with these improvements the principle of a revolving retort divided into compartments, for which a patent was granted to me the said Henry Pinkus, dated fifteenth

of Aug. one thousand eight hundred and twenty-seven.* Fifthly, in the adoption and combination of a feed valve, and compensation valve, or governor, as exhibited in the drawings at fig. 18. Sixthly, in completing the manufacture of the gas by further abstracting its impurities, and rendering it more fit for use by means of a dry chloride of lime purifier, placed at what is called the outlet valve, which purifies the gas after it has left the gasometer on its passage to the street, mains, or burners.

"The mode of preparing the compound material from which the gas is to be generated is as follows: we take of common rosin, or pitch, or any of the bitumen, dissolved by the ordinary means, one hundred weight or a similar quantity of Stockholm or Archangel tar, this being heated to a temperature of from 150° to 200° Faht. we then add to it from about five to seven per cent. by weight of sugar, or molasses, or other similar combustible, affording an excess of carbon, taking care to agitate the mixture continually, until all effervescence ceases. This compound is then in a fit state to be used for producing gas in the way herein described.

"Plate V, fig. 16, is a front or end view of a cylindrical retort A; divided longitudinally into three compartments, as seen at *a, a, a,* in the cross section fig. 19, and in in the longitudinal section fig. 17, which is placed in a common coke oven or furnace *b, b, b*; its periphery resting on friction rollers, placed at *c, c.* Fig. 17, is a longitudinal section of the whole apparatus; *d,* is an end piece, having an elbow and stuffing box, the elbow dipping into a hydraulic joint *e, e,* and communicating with the condensor *f.* In figs. 16, 17, and 18, *g, g, g,* are the generators communicating with the retort, by a pipe *h,* having a feed cock; *i,* is a pipe to supply the generators

* See Vol. I, page 273, Second Series.

by a column, or force pump; *k*, fig. 17, is a pipe leading from the condensor to the feed valve *l*, fig. 18; and *m*, is a pipe forming a communication between the feed valve and governor; *n*, is a lever, one end of which is attached to the feed valve, and the other to the supply cock *o*, fig. 17, by a rod *p*.

"The surfaces of the compartments on to which the heated material is to be injected, should be covered with fragments of bricks or coke. The retort being heated to a bright cherry red, the material may be passed into the generators by means of a force pump, or by a column of the fluid of convenient length, according to the required pressure necessary to keep the generators full. When the fluid has become sufficiently heated, vent must be given at the feed cock, when it will by its expansive force flash off into the retort in small streams or sprays, and will fall nearly equal over the red hot surface, and will consequently be more effectually and quickly decomposed than by the common mode of letting the fluid fall on one part of the retort, which would soon become cooled down to a black heat, and cease to decompose the material, whilst the remaining part of the retort would frequently acquire so intense a heat as to deposit much carbon. The material having absorbed caloric in its passage through the generators, will require proportionably less heat to decompose it in the retort.

"By the common method of using the resinous bitumen, much inconvenience has arisen owing to the detrimental effects produced on the metal of the retorts by the developement of its oxygen, and the consequent formation of acids in the retort. To obviate these injurious effects, sugar, or molasses, or other similar combustibles, affording an excess of carbon, is combined with the bitumen as before described. When this compound material is subjected to a red heat, and oxygen is developed,

part of the latter will unite with the excess of carbon to form carbonic acid gas (which may be removed by purification), and a part will unite with hydrogen to form water, which will be deposited in the condensor, and may be separated from the resinous matter by decantation.

"Another part of our method of neutralizing the aforesaid deleterious effects, consists in admitting into the retort when in action ammoniacal gas, or hydrogen gas in excess, part of the oxygen will unite with the hydrogen gas, or hydrogen of the ammonia, and water will be deposited as before, some nitrogen from the ammonia will appear, the metal of the retort will thus be preserved, and their power to decompose be less impaired.

"The advantages comtemplated in the adoption of the revolving retort for this purpose are, First, that in a given capacity for generating, there is considerably less metal to be heated; Secondly, much smaller ovens or furnaces will be required, and there will be consequently less radiating surface, a saving in fuel, and fewer condensing vessels required; but we do not confine ourselves to any particular form of retort.

"The effects produced in fixed retorts by oleagenous or carbonácious matter falling on and adhering to one surface, is of such a nature as to diminish the power to decompose and obstruct the absorption of heat; by turning the revolving retort on the friction rollers, fresh surfaces are presented to action, when the previous ones will have time in some measure to recover their former condition.

"The advantage contemplated by the combination of a feed valve with a compensating valve, or a common governor *q, q*. Fig. 18, is the regulating by the latter the supply of gas to the burners with more uniform pressure, and preventing the agitation or jumping of the lights, caused by the sudden or unequal velocity of the gas

issuing from the retort. As the gas issues from the retort it enters the feed valve, lifts one end of the lever, depresses the other, and shuts off the supply to the retort. As the gas becomes exhausted, the feed valve becomes depressed, and the other end of the lever at *p*, rises, opening the supply cock, when more heated material flashes into the retort.

"We claim as our improvement, First, the above described method of neutralizing the effects and inconveniences arising from the common manner of using the resinous bitumen, by adding to the bitumen molasses, sugar, or other similar material, which shall unite with the oxygen developed in the retort, and form compounds less detrimental; Second, the means of effecting the same object by admitting into the retort when in action, ammoniacal or hydrogen gases; Third, injecting into the retort any material to be decomposed, whether by the action of a force pump, or by the expansibility of heated material; Fourth, the method of heating in generators under pressure a material to be decomposed; Fifth, the combination of a compensating valve, or governor, in conjunction with a feed valve; but we disclaim them when uncombined or separate; and Sixth, the application of a finishing purifier when placed at the outlet valve, as before described; and we disclaim all other things which it has been necessary for us to mention in our above description, and which are not included in this claim made by us, as 'our improved method and apparatus for generating gas for illumination.'"—[*Inrolled in the Rolls Chapel Office, October,* 1830.

Specification drawn by Mr. Newton.

To Henry Roper, *of Baker Street in the parish of St. Mary-le-bone, in the county of Middlesex, Esq. a Rear Admiral in our Royal Navy, for his having invented a new and improved system of signals; First, for communicating by day, by the means of flags and pendants between ships at sea, or other objects far distant from each other; in which system the colours of the flags and pendants which have heretofore served to distinguish the signals one from another, and which by distance or other causes are extremely subject to be mistaken, may be dispensed with altogether; and, Secondly, for communicating by night, between ships at sea and other objects far distant from each other, by the means of lights; and which system of signals is more conspicuous, expeditious, aud certain, than any which has hitherto been employed for the like purpose.*—[Sealed 21st of June, 1827.]

The features of this invention are almost as fully described in the above title as in the specification itself. The object of the Patentee does not appear to be that of altering altogether the system by which signals or telegraphic communications are made from one ship to another at sea, but to simplify the process, by forming the subjects intended to be communicated into classes, and adapting to each class of subjects, peculiar signals at the onset, leading to the kind of correspondence intended to be carried on. By so doing the number of signals, consisting of flags and pennants are reduced from forty-eight, the ordinary compliment to only twenty-two, and of course are less expensive, more easily worked, and not so liable to mistake as when a greater number are employed.

These signals are intended to represent numerals, and by

being placed at different elevations, point out whether units, tens, hundreds, or thousands; and the number thus shown, refering to a signal book, indicates by the corresponding number in the book, the word or sentence designed to be expressed.

The device upon the flag or pennant is sometimes to be the signal, at other times the colour of the flag or pennant is to be the significant mark, and at night time lanterns, with coloured glass of divers shapes, are to be employed instead of flags.

In conjunction with these, balls and other marks are to be occasionally employed; but as the specification does not point out the modes of working them (which indeed depends upon the previous arrangement of the sentences, word, or syllable in the signa book), it would be useless for us to extend our description of the Patentee's views further.—[*Inrolled in the Inrolment Office, Aug.* 1827.]

To JOHN ROBERTS, *of St. Helen's, near Liverpool, in the county of Lancaster, at present residing in Wood Street, Cheapside, in the city of London, Engineer, and* GEORGE UPTON, *of Queen Street, Cheapside, in the same city, oil merchant, for their invention of certain improvements in Argand and other lamps.*—[Sealed the 24th of November, 1827.]

SPECIFICATION.

"OUR improvements consist, first, in regulating the admission of atmospheric air to the burners of oil, spirit, and gas lamps, where chimney or outside glasses are used, to obtain the best and most perfect combustion of the said oils, spirits, and gases: secondly, in regulating the supply of oil to the burner, and in carrying and keep-

ing it so fully up to the wick, that it may come in direct contact with the flame, and a part of it pass over unconsumed; and by which superabundant supply of oil, the wick or cotton may be kept moist, and prevented from crusting, as is usual, where the common or inferior oils are burned in the Argand lamps, as at present constructed.

"By this superabundant supply of oil, the combustion is greatly improved, but when combined with the improved means of properly regulating the admission of atmospheric air, a brilliant flame may be obtained from oils of an inferior quality (such as seed and common fish oils), in such lamps as where sperm oil has in general only been burned: thirdly, by preserving from waste, and conveying from the burner the oil that has passed the flame unconsumed, to a suitable receiver, and from thence passing it conveniently, and without emptying it out of the lamp, to its original situation in the lamp, in order that it may be returned to the flame for use; which is done, whether the reservoir be in the base of the pedestal, or above the burner: and fourthly, in raising a supply of oil to the burner, when the reservoir or cistern is below it, by a combined liquid and metallic pressure.

"These improvements are fully described and ascertained by the drawings hereunto annexed, and the following description thereof; Plate VI, fig. 1, shews the improved Argand burner *b*, the lamp being partly in section.

"The sides of the cistern are all of equal heights (see its section in the detached figure *l*;) the rim of the cotton regulator and glass holder, is raised about one-sixteenth of an inch above the cistern.

"The advantage of this alteration is, that the oil cannot, as in the common burners (where the outward rim is lower than the inner one,) escape without coming into direct

contact with the flame; and which not only assists in keeping the flow of oil up to the flame, but helps to turn that which is not consumed towards the inside of the burner-tube, on its way to the oil-cup.

"In other principles this burner is the same as those in general use, and is, like them, capable of being made in various ornamental forms; *a*, is the air regulator; it consists of two plates, one working under the other; each plate has holes or spaces of the same size; they are placed directly under the gallery or glass holder, but do not interfere with its free action. The upper one is fixed to the burner tube, the under one is moveable, and, by its action, opens or closes, in part or wholly, the holes or spaces in the upper plate, so that the quantity of air admitted to the outer circle of the Argand burner, can be regulated as required, for the proper combustion of the ignitable matters. The plates are shewn separately in the detached figures, the upper one *a* 1, the under one *a* 2; a gas regulator, on the same principle, is shewn in the detached fig. 7.

"The cover *c*, of the upper part of the cylinder and case of the oil lamp, fig. 1, lifts up when the oil is to be poured in, and is fastened down by two pins passing into grooves, or it may be left loose at pleasure. The oil may also be put in at the cup *h*, and pass down the pipe *i*, when the cover *c*, may be soldered to the top of the cylinder, so as to allow the quantity of oil, lying on the top of the disc of the piston, to be increased; *d*, is a fixed flooring, through the centre of which a piston rod *x*, is allowed to pass freely; it has openings, to let the oil proceed through to the disc or plate *l*, where it remains till let through the valve into the lower chamber *f*, which is effected by raising the piston rod; *e*, is the upper chamber or space between the flooring *d*, and the disc or plate *l*.

"The extent of this space is increased or diminished by the quantity of oil contained in the lower chamber *f*, as will be seen by comparing figs. 1 and 2; fig. 1, being supposed to be full of oil below the valve, and fig. 2, to be nearly empty; *f*, is the lower chamber of the cylinder, which lies under the piston disc valve, and receives all that passes from the upper chamber *e*, through the valve *o*. The oil here is in direct communication with the supply-pipe *g*, and is acted on by the oil lying above the disc, and the weight *n*, and is propelled upwards, through the supply-pipe *g*, to the burner-tube *b*.

"The supply-pipe *g*, which rises from the lower chamber *f*, and is connected by a screw or otherwise to the burner-tube *a*, may either be carried outside the cylinder as in fig. 1, or passed up the centre through the metallic weight *n*, in the centre leather packing, the disc *l*, the waste pipe *i*, and the piston-rod *x*, to the burner *b*, as in fig. 2; *h*, is the oil-cup, or receiver of the overflowing oil from the burner; it has a grating at its bottom, by which the oil passes to the pipe *i*, and thence to the disc, to be passed through the valve *o*, to the lower chamber *f*.

"This pipe may be distinct from the supply-pipe, as in fig. 1, or it may form a covering to it, as in fig. 2; in both these cases it has holes at the bottom to let the oil through; *k*, is the leather packing which surrounds the disc *l*; it is firmly held between the upper and lower plates of the disc, which are screwed together. The metallic disc or plate of the piston rod should nearly fit the cylinder; it is circular, and is composed of two parts, screwed together, (as in the detached figs. *l* 1, and *l* 2,) holding the leather packing between them: the outward edges are surrounded with leather or other flexible material, to make it oil-tight; it must also have leather or other proper packing, protected by a screw or other

means, to secure an opening in its centre, when the supply ppe, as in fig. 2, is carried through it.

"The disc may be connected with the piston rod by a small ball, inserted in a socket, so that it may move in any way; it has holes or spaces on its surface, to let the oil pass through to the under plate, and a valve *o*, which opens downwards, and lets the contents of the upper chamber *e*, pass to the lower chamber *f*; *m*, is a rim of metal, which connects the rim of the lower piston disc with the weight *n*, shewn in fig. 1; it may be screwed, as in fig. 2, or otherwise fastened to each; it surrounds the valve in fig. 1, and has holes round it to let the oil through; *n*, is a metallic weight, connected with the disc *l*, and with the rim *m*, fig. 1, or by a screw as in fig. 2; *o*, the valve of the disc, opens a small way downwards when the piston rod *x*, is raised, and is closed by the under pressure when the piston rod is depressed; it is composed of leather, or may be made of any flexible material proper for the purpose, shewn in the detached fig. 10; it is shut in fig. 1, and open in fig. 2.

"The outside or ornamental case of the lamp is shewn at *y*, *y*, figs. 1 and 2; *z*, is the gallery or glass holder; *p*, a case to the burner tube, to prevent the oil which overflows being seen outside the burner; the cup in fig. 1, screws on it at the bottom, and in fig. 2, it rests inside the cup; if thought unnecessary, it can be omitted; *q*, is the cock to regulate the supply of oil to the burner; it may be placed in any part of the oil pipe, where it may be found most convenient or ornamental: the opening in it may be either a hole through the stopper, or an aperture made at one side; *r*, *r*, are pipes or pillars in fig. 1, to support the burner tube and for ornament; *s*, *s*, screws in sockets or plates, to fasten the pillar *r*, on one side to the flooring *d*, and to connect that part of the supply pipe *g*, above the flooring to that which runs from the lower part

of the cylinder, and passes through its side directly over and on the flooring, as shewn in fig. 1.

" These pipes or pillars may also be fastened by a union joint; *t*, is a plate with a hole in it, soldered to the flooring *d*, and lying under the screw plate *s*, which connects the upper and lower parts of the supply pipe together; it has a leather packing to prevent leakage; *v*, is a circular hole and screw, to let out any impure matter that may be deposited in the lower chamber; which hole may be used or not at discretion.

" The pipe which conveys the waste oil from the cup has two studs or handles, in fig. 2, which serve to raise it; a ring may be put to facilitate the raising of it, or it may be raised by a windlass and chain, as in the detached fig. 3, or by pullies, or other mechanical powers well understood; *u*, is a perfect metallic cylinder, tinned inside, and forms the base of the lamp; it extends from the circular hole to the cover *c*, shewn in fig. 2, above the disc; it supports the oil that forms the liquid pressure below; it contains the weight or metallic pressure, and the oil to supply the burner.

" The liquid pressure, during the action of the metallic pressure, is increased by the oil which passes unconsumed from the burner. The vessel may be considerably decreased in its dimensions, but any reduction in its size must be governed by its having to contain, in addition to the necessary machinery before described, the oil to supply the flame for the length of time the lamp is reqtired to burn.

" The detached fig. 10, represents a piston rod, through which the supply pipe passes, a screw shews where it is connected with the disc and weight, and how it and the disc are connected by a ball and socket; an aperture is made through the weight for the supply pipe to pass, which is surrounded by leather packing, to prevent the oil rising

through it from the under chamber, and the packing is held and secured under the screw that connects the disc and weight together. There is a socket fixed to the bottom of the cylinder, with holes, to which the supply-pipe is screwed, as shewn at *v*, fig. 2. This also shews the opening at the bottom.

"In fig. 2, is a section of the supply-pipe, shewing how it passes through the cup, and is attached to the burner by the screw; this section also shews, that it is covered by the pipe that carries off the waste or unconsumed oil that has passed from the burner, which pipe is also covered by the piston rod, which is raised to its greatest height when the lower chamber is full of oil; and it will be observed that these lamps are capable of all the variety of forms common to pillar lamps, where the oil to supply the burner is contained in a vessel of a cylindrical form, in or near the base of the pillar.

"To charge or fill the lamp the oil should be poured in above the flooring, either by lifting up the cap when that is loose, or pouring it in at the oil cup. When sufficient oil is poured in, the piston rod should be gently raised, by which means the lower chamber will be quite full; the piston rod should then be left to its own action, and when the lamp is to be lighted, the cock should be turned on; this last operation may be done a few minutes before the lamp is wanted. If too great a supply of oil should be passed to the flame, it may be restrained by the cock; a valve *h*, in fig. 5, may be attached, to give notice when it is full of oil, to prevent its running over.

"Fig. 4, represents several detached parts of a lamp made to receive a ribbon or flat wick, and has no inner current of air; the air is admitted through the regulators to the outside of the flame, and passes to it between two caps or inverted metal dishes, with apertures in their cen-

tres. The wick rises through the under one, and the flame only is allowed to pass through the upper one. The effect is, that the air allowed to pass through the regulators, comes in direct contact with the flame, as it must pass between the space left between the upper and under dishes, and can only escape with the flame through the aperture in the upper one.

"This burner and apparatus may be applied to all lamps with flat wick. The oil flows to it in the usual manner, and it may receive a chimney glass of the common kind; *a*, the outward case; *b*, the circular air regulators, as described above; *c*, the rim, over which the under dish *d*, is placed; *e*, is the upper dish, which conducts the air to the flame, and is placed over the smaller dish *d*; *f*, is the cotton holder, which is a metal case, with an aperture, to allow the oil to flow to the wick, and another near the top, to allow the wick regulator *i*, to act on it; it has also two wires *n*, to prevent its slipping down the case; *k*, is the case through which the oil flows at *l*, to the inner case *f*; it has also a square projection, to receive the prong of the cotton regulator *i*.

"In fig. 5—*a*, is a vase above the burner, containing oil to supply the flame; *d*, is a space in the pillar, through which the oil passes to the burner from the vase; *c*, is a cock, to regulate the supply of oil to the burner; *b*, is the burner tube, made on the same principle as fig. 2, with air regulators, oil cup, grating, and other necessary appendages; *f*, is the ornamental mouth of a pipe, which receives the overflowing oil from the cup, and conveys it to the upper chamber, from whence it passes through the valve *h*, to the lower chamber *i*. There is a communication with the vase *a*, by a pipe *l*. By the action of the pump *k*, the oil collected in the lower chamber *i*, can at any time be returned or carried to the vase *r*.

"The handle of the pump rises out of the base, so that it can be conveniently worked; it may be ornamented in any way; *h*, is a valve which is always open, unless the lower chamber is filled with oil, when it rises and carries the rod *q*, through, by which notice is given that the lower chamber or reservoir is full. The valve *h*, has a cork bottom, or other light material that will cause it to rise; this valve may be applied to figs. 1, 2, and 3, if desired; *p*, is a valve with an air hole through its top, and is on the same principle; it is made of cork or any other light material, to float when the ball is filled, either from the top through the aperture, or from the reservoir by the pump; they have both leather on their tops, and the one that acts in the vase rests on wires, so as not to stop the aperture when oil is to be poured in; this also prevents any oil being forced over by the pump.

"The pump *k*, is made after the usual method of pumps, and may be varied according to the form of the cylinder; *s*, is the flooring, over which the oil flows to the burner tube from the vase *a*; this lamp can have any number of burners attached to it.

"In fig. 6—*a*, is a vase or circular rim above the burner containing oil; *c*, is the cock, to regulate the supply of oil to the burner; *b*, is the burner tube, same as in fig. 2, with gallery regulators, although not shewn; *d*, is a pipe to carry the oil from the rim to the burner; *e*, is a pipe which screws on to the mouth of the pump pipe, to conduct the oil from the lower chamber or reservoir to the rim; *h*, is the oil cup, with grating, to let the overflowing oil pass to the reservoir; *i*, is the part of the pump pipe, into which the pipe *e*, is screwed. The pipe coming from the pump must be sufficiently secured by braces, to enable it to support the weight brought on it by *e*.

"Fig. 8, is the same, except that the cock to regulate it is placed nearer the rim, and the supply enters above the screw; *p*, is the valve, the same as described in fig. 5; the oil cup, as shewn in fig. 6, is only attached to the vase and burner when the pipe *e*, is screwed into it. These lamps are filled at the valve *p*. The lamp or lanthorn, fig. 9, only receives air directly through the bottom of the oil vessel; the air is thus brought into immediate contact with the flame, and to effect that purpose with more certainty, a circular plate, having an aperture in its centre to receive the wick, is shut down upon the opening through which the air comes to the flame; this circular plate is shewn in the section at *a*, as lifted up on its hinge on the occasion of trimming the wick. The oil vessel is moveable, and can be taken out; it passes through a groove, by which means the external air is better excluded. It is (as before stated) intended, that no air shall be received but at the bottom, by which the brilliancy of the flame is greatly increased and the smoking prevented; and to secure this lamp from being blown out by any violent gust of wind, there is a swinging tube of leather, or other flexible substance, with holes at the bottom, and rings to keep it distended, so that the air may never be entirely excluded.

"The beneficial effect of this plan is, that the flame cannot be put out, as the mouth of the leather pipe will always be opposite to the part from whence the wind blows; and for further security, the top of the air pipe which enters the lamp has a plate of metal, raised about a quarter of an inch above its mouth, that the air received through it may be properly diffused.

"When used for lighting lobbies, passages, or against houses, the air pipe may receive its supply from a box or other place, protected from sudden and violent gusts

of wind. The top part, shewn in the section, is made on the principle of the smoke jack, to carry off the heated air, and also to prevent gusts of wind from entering above the flame; it is surrounded by a case full of holes, which is so acted on by the wind as to always turn the opening of the ventilator from it.

" To this lamp *a*, is the plate through which the flame passes, and which brings the air into contact with it; *b*, the oil vessel, having a space round to let the air rise to the flame, the part which holds the wick being connected with it by a pipe, to receive oil to supply the wick: the air consequently circulates freely below the flame, and is brought into close contact with it by the plate; *c*, is the pipe up which the air rises; *d*, is a leather hose, screwed on to the mouth of the pipe, to prevent any violent gust of wind entering to extinguish or disturb the flame; and is of sufficient length to give it play; it has also rings, to prevent its closing and entirely shutting off the air when violently acted on; *e*, is the metallic top, full of holes, to let the heated air pass out; *f*, is a fly, which works on a spindle; *i*, is a plate to regulate."—[*Inrolled in the Inrolment Office, May,* 1828.]

To Lemuel Wellman Wright, *of Mansfield Street, Borough Road, in the county of Surry, Engineer, for his invention of an improvement or improvements in the construction of wheel carriages, and in the machinery employed for propelling, drawing, or moving wheel carriages.*—[Sealed 15th April, 1828.]

This invention is a peculiar mode of constructing the carriage, and its appendages, of a loco-motive engine, the ac-

tuating power of which is to be derived from the elastic force of compressed air.

SPECIFICATION.

"My invention of improvements in the construction of wheel carriages, and in the machinery employed for propelling, drawing or moving wheel carriages, is particularly described and ascertained in and by the drawings hereunto annexed, and in the following description thereof:—

"Plate VII, fig. 1, is a plan or horizontal view of the machinery and working parts of a wheel carriage; fig. 2, is a side view or elevation of the same, and the several letters refer to the same parts in both these figures; *a, a, a, a*, is the frame work upon which the engines, machinery, and body of the carriage are mounted; *b, b*, are two metal cylinders, containing compressed atmospheric air, which are filled through the pipes and cocks *c, c*, either from a stationary reservoir or otherwise; from these cylinders the air is allowed to pass in such quantities as may be required through the pipes and cocks *d, d*, (which may be worked by hand or by gear from the other parts of the machinery) into a third cylinder *e, e*, where the air is rarified and rendered more elastic before passing into the cylinders of the two engines, by the heat from the furnace *f*, passing through the pipe *g*, into pipes within the cylinder *e, e*; when the air being heated, becomes more elastic, and its expansive force increased, it is then admitted through the supply pipe *h*, and slide valves *i, i*, (which are worked by the eccentrics *j*, and rods *k*, in the common manner) into the engines *l, l*, where exerting its elastic force upon the pistons and piston rods *m, m*, in the manner of steam in the common alternating steam engine, rotatory motion is communicated by the connecting rods *n, n*, to the cranks *o, o*, the shaft *p*, and the drums *q, q*, which are connected by the bands or straps *r, r*, to the

drums *s*, *s*, which are affixed upon the naves of the running wheels *t*, *t*, thus communicating motion to the wheels and propelling the carriage.

"Steam may be generated by the furnace *f*, in a small boiler, or pipes, and be then conducted to the cylinder *e*, *e*, where giving out a portion of its heat to, and combining with the compressed air, the air is thereby rendered more elastic. The heat or steam from the furnace *f*, may be conducted to the engines (without using the third cylinder *e*, *e*,) and there unite with the compressed air from the cylinders.

"By any construction of proper connecting gear, the man having charge of the machinery, may control the working of the engines, valves, cocks, and force pump, and stop, or abate the speed of, or set the carriage going, as may be requisite. A crank or eccentric motion may be added to the shaft *p*, and by a connecting rod, work a pump, to compress and force air into either of the cylinders, when the carriage is going down hill, and which will also serve as a break to check the speed in descending.

"When the carriage is to be guided out of the straight line, the winch handles 1, 1, are to be turned round, and the bevel wheel on their shaft 2, acting on another bevel wheel, on the end of the upright rod 3, communicates motion to the drum or pulley 4; upon this pulley are attached the ends of two chains or cords 5, 5, their other ends being connected to the drum or pulley 6, upon the shaft 7; on this shaft is another pulley 8, with the ends of the two chains or cords 9, 9, fastened to it, their other ends being connected to the opposite ends of the axle 10, 10, of the fore wheels 11, 11; upon motion being given to these drums, the chains are wound on, and off them, and cause the axle tree 9, 9, to turn out of the right angle, to the track of the carriage, thus causing it to travel in a curved line.

"At different stations of the road on which the carriage is intended to travel, strong metal reservoirs are to be placed, which are to be filled with atmospheric air, compressed to the required density, by a common force pump, worked by steam or water power. From these reservoirs, the air passes through proper connecting pipes and cocks into the cylinders *b, b,* contained within the carriage, as often as the same may require to be filled, whence the air passes to the third cylinder *e, e,* in the manner before described, in such quantities as will keep up a sufficient supply to the engines.

"Fig. 3, is a representation of a rotatory engine, adapted to work machinery for propelling carriages, one of the side plates being removed to shew the interior; *a,* is the induction pipe; *b, b,* two piston leaves, moving on hinge joints within the interior cylinder *c, c,* fixed on the shaft *p*; the combined air, and steam, or heat, exerting its expansive force against the piston leaves *b, b*, carries them with the cylinder *c*, and shaft *p*, round, until the piston leaves pass the eduction pipe *e,* when the stop piece *f,* causes them successively to close as they pass under it, to come into the situation where each respectively is thrown up into the position shewn in the drawing, by the trip levers *g, g,* striking against the friction roller *h,* and thus maintaining a rotatory motion, which is to be communicated by the straps and drums as before described, to the carriage wheels, for propelling the carriage.

"The carriage represented in the figures is adapted to carry passengers and goods, as well as to employ its locomotive power in drawing other carriages after it; I do not however mean or intend hereby to claim as my invention the particular parts of which the same may be composed, excepting as applied to the propelling, drawing,

or moving wheel carriages by the agency of compressed air, heated and used in the manner above described."

[*Inrolled in the Inrolment Office, Oct.* 1828.]

Specification drawn by Mr. Berry.

To Walter Hancock, *of Stratford, in the county of Essex, Engineer; for his invention of an improvement or improvements upon steam engines.*—[Sealed 4th July, 1827.]

The subject of this Patent may with more propriety be called, an improvement in the construction of boilers for generating steam, than of steam engines, as it has no reference to engines except in the necessary adaptation of a boiler of some kind to provide steam for putting the engine in operation.

The Patentee proposes to construct his boiler of a series of flat tubes, of considerable breadth and length, but of very little thickness, in order to expose a very greatly extended surface, for the action of the fire, upon a series of thin stratums of water. These tubes or flat vessels of water, are to be placed in vertical positions in a furnace, and to be connected together by horizontal pipes or tubes, so as to constitute the whole series of tubes as one vessel, the water occupying the lower parts, and the steam of course rising to the top, and passing off by suitable channels to the induction valve of the engine.

The contrivance is proposed principally as a mode of constructing boilers or generators, for loco-motive carriages, as the small capacity of the tubes or vessels holding but little water, renders the whole comparatively light: though the evaporation, by the extended surfaces must go on very rapidly, and of course a large volume of steam will be given off.

The mode of constructing these boilers as shewn in plate VI. fig. 11, is a perspective view of one of the tubes or vessels detached; it is formed by a long plate of thin metal, the ends of which are to be braced or riveted together; the plate is then cut into the shape exhibited, and two iron bars *a*, with openings or eyes *b*, *b*, of thin ends, inserted at the outer edges or sides of the vessel to which the plates are secured by rivets, or screws. A flat tube is thus formed with an extended surface, but of small thickness, and it is kept from expanding or collapsing by studs placed within at certain distances apart, and secured by screws or bolts, with rivets passed through both surfaces of the plates.

The enlarged or cylindrical ends of the tubes constitute chambers at bottom and top, for the passage of the water and steam, and when a series of these vessels are combined, the water and steam flow freely from one vessel to another.

A series of these tubes are shewn correeted and in section at fig. 13, with the other parts, constituting a complete boiler. There are four holes perforated through each of the tubes at *c*, *c*, *c*, *c*, with rings inserted in them, and these have small apertures for the purpose of letting out the water and steam into the longitudinal tubes *d*, *d*, *d*, *d*, fig. 11, when the whole of the boiler is put together nd in action.

The detached fig. 12, shews a ring *d*, with a bolt and nut *e*; one of these rings *d*, is placed against such of the apertures *c*, between the vertical tubes or vessels, as shewn in fig. 12, covering the apertures *c*, *c*, and fitting very closely with packing, and a bolt being passed through the whole series and screwed up tightly by means of the nuts *e*, *e*, the whole series of tubes are combined

and free ways are formed for the passage of the water and steam from one vessel to another.

End tubes f, f, fig. 13, are constructed and united in a similar manner, and they as well as the tubes d, all lead into a flat chamber g, at top, in which the steam revolved through k, k, and from above it is passed off by a pipe to the indication part of the engine. The water for supplying the boiler is injected at the lower pipe i, i, combined and secured in a similar manner to that above described, and from thence it pours into the other vessels. The bars of the furnace k, k, rest upon the lower pipes, and the flame and heated vapour, from the ignited fuel ascending out against the surface of the tubes, and causes the steam to be generated copiously; the smoke passing off into the chimney, by channels l, l, made through the horizontal chamber g.—[*Inrolled in the Petty Bag Office, January,* 1828.]

To GOLDSWORTHY GURNEY, *late of Argyle Street, Hanover Square, but now of Albany Road, Regent's Park, Mary-le-bone. in the county of Middlesex, Surgeon, for his invention of certain improvements in loco-motive engines, and other applications connected therewith.*—[Sealed 11th October, 1827.]

THE invention which constitutes the subject of this Patent, was intended to perfect the steam coach, which acquired so much notoriety some time back.

It is known to our readers, that though all the world appeared to be satisfied that the great desideratum, a steam coach, running upon ordinary roads, was at length

achieved, we entertained considerable doubts upon that subject; and therefore anxious to allow the inventor every possible chance of success by giving him time to arrange such modifications as experience might prove to be necessary; we have withheld our report of this patent, much longer than we should otherwise have done; still, however we are in the same state of doubt, for by nothing that we have yet seen are we enabled to say, that the project of driving a coach upon an ordinary road, by means of steam is yet proved to be *practicable.*

The present improvements are represented to be not new in principle, but arrangement of the parts necessary to a steam coach, than has been heretofore adopted, indeed the greater part of the details of the machinery, are described in the specifications of former patents granted to the same gentleman, see our first Series, Vol. XIII. pages 74 and 77.

The general construction and arrangement of the parts of the steam coach, according to this last improvement is shewn in plate VII, at fig. 4, which is a section taken longitudinally through the coach, and through the boots and other parts, which enclose the machinery *a*, is the furnace and boiler, which is situate in the hind boot. The boiler consists of a series of pipes or tubes of small capacity, which are bent and twisted in various directions, and enclose the fire within their coils. These tubes being filled with water, cause a quantity of steam to be generated at a tight pressure, which is conducted to the eduction aperture of two steam engines *b*; the actions of the pistons of which drive the carriage.

The pipes which constitute the boiler, discharge the steam and heated water into the horizontal cylindrical tubes *c, c,* and those in the vertical tubes *d, d,* called separators; from those vertical tubes the steam passes

through a pipe *e*, to the engine, but the water which has been separated from the steam, runs again into the boiler by another channel; *f*, is a safety valve, provided at the top of the steam pipe to prevent explosion, and a throttle cock *g*, is placed near the conductor's seat in front to regulate the supply of steam, and consequently the speed of the carriage.

The tank for the water is placed under the carriage at *h*, and a small steam engine is placed at *i*, for the purpose of working the pump *k*, which supplies the boiler with water, and for actuating a rotatory fan *l*, which constitutes a blowing apparatus for keeping up the fire in the furnace within the boiler; the current of air passing through the channel *m*, *m*, under the body of the coach into the furnace behind. The blower may be occasionally worked by a wheel when the fire is to be raised, or by an attachment to the running wheels, and a damper may be introduced to regulate the supply of wind.

The carriage is driven by means of the rods *n*, which are connected at one end to the piston rods of the engine *b*, and at the other end to the cranks *o*, *o*, on the axle of the hind wheels of the carriage. Thus the hind wheels being driven round, the carriage is impelled forward.

The conductor placed on the seat in front, has hold of the end of the lever *p*, by which he turns the pilot wheel *q*, in such direction as may be desired.

There is a spring *r*, connected by chains with the pilot wheel, which keeps the wheel in a direct line of motion, when the lever is not restrained by the conductor, as in turning; and *s*, is a break or drag for stopping the rotation of the hind wheel, in going down hill. It is also proposed to connect propellers (we presume legs) to the crank rods *n*, if occasion should require.

The framing of the carriage and its body, may be made in various forms, and the details of the mechanism may be differently modified, but as nothing now is proposed in their construction or adaptation, and they are generally known as parts of all other loco-motive engines, it is unnecessary to go into more minute description as the patentee's claim of invention consists simply, in the arrangement of previously known contrivances as above described, and not in the parts themselves, which are either embraced in his former patents, or are already common property.—[*Inrolled in the Inrolment Office, April,* 1828.]

Novel Inventions.

Improved Gearing Chain.

An ingenious and useful construction of gearing chain for connecting cog wheels, has lately been invented by Mr. Oldham, engineer, of the Bank of Ireland, which we think highly deserving of the attention of machinists, as it is so extensively applicable to various kinds of machinery, such as carding engines, and indeed in almost every situation where a series of toothed wheels are required to be driven by one mover. It consists of a peculiarly constructed chain with curved links, which when passed round a drum will serve as teeth and act as a cog wheel to turn pinions, &c. and when stretched out straight, or placed on a flat surface, will form an endless rack. It may also be passed over and under a series of rollers, pinions, &c. forming a carrying chain instead of the commonly constructed chains, in which spiked wheels are employed to take into the links of chains in carding engines, and various other kinds of machinery.

This improved chain will work with much better effect in connection with pinions, or wheels with common teeth, into which it is suited to gear, without the possibility of slipping off, or riding over the points or spiked wheels having a broader surface of contact, and is not at all liable to get out of order, being much stronger than the old linked chain and spur pinion.

Plate VII. fig. 5, is a side view of a portion of the improved chain. Fig. 6, is a plan view of the same, that is formed by crescent shaped plate constituting links, which are connected together in pieces, that is one and two alternately, or two or three or more placed side by side, the alternate links fitting in between each other at the joints where they are connected by pins or bolts passed through their eyes in lateral directions.

It will be seen that these curved links present on one surface of the chain, a simicircular hollow, like a rack for the teeth of the pinion to take into, and that the ends of the links, when the lath or rivets are passed through are formed semicircular, and the same size as the space or hollow of the link. These ends constitute teeth on the chain, and take into the spaces between the teeth of the pinions or wheels, and consequently drive them; or the chain itself is driven by such pinions or wheels in the same way as a rack.

It is obvious that such a chain may be passed in various directions over wheels, on its face, and over drums at its back, and may be used with certainty of effect, as whatever motion is given to the chain will be communicated to all that it is in gear with.

Fig. 7, shews such a chain, supposed to be endless, carried over part of the periphery of a carding cylinder, and constituting a circular rack or toothed rim, which drives all the pinions connected to it; the back of the

chain is conducted over a roller, and brought into gear with other pinions or wheels; but as numerous illustrations might be produced of its applicability, it is unnecessary to say more, as its adaptation to a very wide range of machinery will at once be perceived by every practical mechanic.

Improved mode of coupling Machine Bands or Straps.

Mr. E. Budding, of Stroud, Gloucester, the recent Patentee of an ingenious machine for mowing lawns, has lately invented a new mode of uniting the ends of leather straps or bands, employed in driving machinery, which, from its simplicity and perfect security, will beyond all doubt, be adopted in every mill and manufactory where leather strapping is made use of instead of lacings, thongs, rivets, or buckles.

In some mills where very long bands or straps are used, it is customary to secure the several pieces together by rivets to form the whole length of strap, and to attach the two extreme ends by lacings, so as to allow of adjustment. This mode of fastening is objectionable, as the hammering of the rivet, unless very carefully done, is liable to bruise and injure the latter, and frequently causes them to break, as such parts when in use serve to make a screw joint. Many rivets must be used which is both expensive and troublesome.

Fastening straps with lacings or thongs is also objectionable, as they require many holes to be pierced through the straps, which weakens them, and when they require adjusting, a considerable time is lost in unlacing and relacing them again, to take up a hole, during which time the machinery must stand still; and the lacings, in passing over the drums, are often cut, and very soon wear through, thus producing delay and expence, and injury to the machinery. These disadvantages are so well known to all practical men, who have the superintendance of machinery, that we feel convinced any attempt to obviate them will be acceptable to our readers.

Mr. Budding's plan consists in employing studs, or metallic buttons, the shanks or stems of which are hollow sockets, having a female screw cut in them.

The stem or shank is as long as the thickness of the two pieces of strap when combined, and is made truly cylindrical, fitting the holes punched in the straps at the proper places of union. When the holes in the end of the the strap are brought together, the socket or shank of the stud is introduced through them, with the button or disk on the underside, and a screw with a large flat head is screwed tightly into the socket of the button, which compressing the leather between the buttons, and the screw head, as it becomes tightened up, keeps the two peices in close contact, and produces a tight and screw joint, the strap being as pliable at the junction as at any other part.

Plate VII, fig. 8, to a view of the two pieces of strap fastened together, as seen on the upperside; fig, 9, is an edge view of the same; fig. 10, is a representation of the button or disk with its socket rim and the top screw seperated from each other: fig. 11, a representation of them when put together.

When two pieces of strap are to be united, it is only necessary to punch the holes of the proper size, to suit the stem of the bottom intended to be used, and on bringing them together, the socket is to be introduced through them, and then the large headed screw introduced into the socket and screwed tight up.

It is obvious that this operation will take but little time, and a stop can be unfastened and a hole let out or take up and fastened again in a few seconds.

Straps of sufficient strength and thickness, will require different size buttons and stems, according to the rate they have intended to do. They are generally used three together for securing one junction of the straps, for all ordinary purposes of machinery, but for a steam engine strap perhaps five may be required, more than five is seldom necessary, unless to an engine of very great power.

The operation of attaching the straps by these studs is greatly facilitated by the use of a punch of a rather novel construction, likewise invented by Mr. Budding, the form of which is shewn in fig. 12. It consists of a clamp *a*, through which is passed the thumb screw *b*, on the lower end of which is the punch *c*. When the straps are adjusted, they are held between the clamp as at *d*, and the thumb screw turned round, when the punch will cut a perfectly clean hole through both straps at once.

On the band of the clamp is the concave piece of steel *e*, which is file cut on its surface; when the socket of the button has been introduced into the hole, this concave piece is placed against the button, at the underside of the strap, and held in contact with it, while the screw is driven up tight, the rough file cut surface preventing the button from slipping round. Different sized punches may be fitted to the thumb screw or clamp, to suit the sockets of the different sized buttons, some of which are made small enough to connect the leather straps of carriage harness, and it would be very desirable if stage coachmen and guards were to carry a few of these buttons in their waistcoat pockets, in case of accident.

These studs are sold from 3*s*. to 4*s*. 6*d*. per dozen, according to the size.

Improved Pocket Thermometer.

An ingenious adaptation of the Pyrometer has recently been manufactured by Mr. Wrench, philosophical instrument maker, Gray's Inn Terrace, which answers most of the purposes of a thermometer, and which, for scientific purposes, must evidently be very superior to any thing

of the kind hitherto introduced. The operating part of the instrument consists of a circular bar or ring of steel, and a similar ring of brass, both cut open, to allow of expansion. These two rings are placed in contact, something like a compensation balance of a chronometer, which by expansion and contraction, through the means of a delicately contrived spring, gives motion to an index, which points out the degrees of heat or cold, on an enamelled plate. The instrument is about the size of a common pocket watch, and will be found very useful by its extreme portability, is not so likely to be broken as a glass tube with moving. It possesses all the delicacy of thermometrical observation that could be desired.

This instrument may be relied upon in preference to any other thermometer that has hitherto been introduced, the expansion being under all circumstances equal, and having a most decided advantage over the glass tube instruments, where a variation frequently is found to arise from the increasing of the bore of the tube, and the consequent variation of effect, from the difference of the capillary attraction of the mercury on the sides of the column.

In Plate VI. fig. 14, represents the instrument, a portion of the dial plate being removed to shew the parts within. It will be seen, that one end of the open ring is secured by a screw firmly attached to the plate, while the other end is left open. The ring is composed of brass within and steel without, and a small piece projecting from its extremity, rests against the arm of the pendant toothed segment. This toothed segment takes into a very small pinion in the centre of the plate, which is upon the axle of the index and a very fine coiled spring is connected to the axle, which draws the index round in one direction, while the expansion of the ring forces it in the opposite direction.

When by an increase of temperature, the circumference of the ring elongates, the arm of the pendant segment is pushed to the side, and by the same act the pinion is turned, and the index carried round the dial plate, indicating the degree of heat; when the temperature becomes reduced, the metal ring shrinks, and the spring coiled round the central axle, brings back the pinion, and the toothed segment and the index points out the degree of cold.

The variations of temperature are not so quickly indicated in this instrument, as by the mercurial or spirit thermometer, but the expansions of the metal ring not being so subject to error, a more perfect thermometer may be constructed upon this principle, and in our opinion, more convenient than the old kind, and more elegant in appearance.

REPORT

Of the Select Commitee of the House of Commons on the Laws of Patents.

(Continued from page 114.)

Thomas Aspinwall, Esq. called in; and examined.

You are Consul of the United States of America, resident in London?—I am.

Are you acquainted with the American law of patents?—Yes.

Is the American law pretty nearly the same with the English law?—In many respects it is very different.

What is the term for which patents are granted in America?—Fourteen years.

Do they grant patents for any shorter period, at the option of the inventor?—No.

Does any considerable length of time elapse, between the application for a patent and obtaining a verification of it?—No more than is necessary for the simple transaction of the business. It may be got through in a day if persons will attend to it, and the length of the papers admit of it. The Attorney General is allowed fifteen days for examining them, in order to ascertain whether they are conformable to the statute, but the great simplicity of the documents enables him to perform this duty with the utmost promptitude in ordinary cases.

Are they required to enter an accurate description of the invention in any public office?—They are.

Is that description secret or open?—It is open. The description must be such as to distinguish the invention from all others that have preceded it; and if it be a machine, it must be in such terms as to enable a workman to make it; or if it be a composition of matters, so that it may be compounded; this description is made a part of the patent, and must not refer to drawings or the model, if it can be avoided. Wherever the requisite clearness cannot be attained without such references, the applicant furnishes two sets of drawings, one of which is attached to the letters patent.

Will you have the goodness to describe the mode of application for a patent in America?—The first step in the process is the payment of about 6*l.* 15*s.*, or thirty dollars of American currency, into the patent office. The applicant obtains duplicate certificates of that payment, and takes one of them to the office of the Secretary of State, to whom, at the same time he presents a petition applying for a patent for his invention, describing it shortly. He annexes to the specification, which generally accompanies the petition, an oath, that he is the true discoverer of his invention, and that he is a citizen of the United States; those two facts are all that is required in the affidavit. The Secretary, if there be no interfering application, immediately assents to the letters patent being granted, and the papers are then taken by the applicant to the patent office, where the specification, signed by himself, and attested by two witnesses, is then lodged, accompanied with drawings; and if it be a description of a machine also, with a model, if the Secretary directs it shall be so, in order that there shall be no mistaking the exact nature and extent of the invention. This whole process may be accomplished in half a day, if there were a person on the spot to attend to it, and if the necessary writings could be made within that time. When the letters patent are prepared for signature and sealing, they are submitted to the Attorney General of the United States, who within fifteen days, if he finds them to be conformable to the Acts of Congress on the subject, returns them to the Secretary of State, who presents them to the President for signatnre, and causes the seal of the United States to be affixed to them. After being recorded in the books of the proper office in the department of state, the letters are delivered to the patentee or his order.

Are any means taken to ascertain, whether the person has given an accurate description of his invention beyond that of requiring a model?—No, he may be told by the superintendent, or other officer of the patent office, that his description is imper-

fect. It is, however, not very likely, in the present state of the patent law, that the letters patent will be refused on that ground, but still they may be avoided afterwards in a court of law, on account of imperfections in the specification.

Is it at the option of the Secretary of State to compel him to give a model or not?—Yes; he is always obliged to furnish drawings as a matter of course, and a model at the option of the Secretary.

Does it often happen that models are required, or are they content with drawings in most cases?—They require models whenever the machine is complicated.

Is the inventor himself apt to desire, that a model should be deposited in order to secure the invention to himself?—From personal knowledge I cannot say.

Are patents often set aside in America from imperfection in the description?—Sometimes, but not very frequently, they have been set aside for want of form in the specification; they have been set aside for some very substantial cause, such as the invention not having been an original one; that it was a second discovery of the same thing, or that the specification, in some part of it, only claimed what was previously known.

Are they often set aside for an imperfect description of the way of making the machine?—I know of but one case of that kind, they may be annulled for claiming or including more than the invention.

Are piracies very frequent?—They have been attempted, but a reference being always easily made to the patent office, and in such a case if it be found on examination that the invention has been patented in due form, there is no difficulty in getting damages in a court of law.

What is the mode of trying a patent right in America?—After a patent has been issued, the right of the patentee may be tried in two ways under the statute, either upon a rule of court to shew cause why the patent should not be annulled, founded on the affidavit of any person filed in the district court of the district where the patentee resides, and alleging that the patent was obtained surreptitiously, or upon false suggestions; or, secondly, in a suit brought by the patentee for an infringement. In the latter case, the defendant may give in evidence under the general issue, any special matter of which notice is given thirty days before trial, tending to prove that the patentee's specification does not contain the whole truth relative to his discovery, or that it contains more than is necessary to produce the desired effect; which concealment or addition shall fully appear to have been made for the purpose of deceiving the public; or that the subject of the patent was not originally dis-

covered by the patentee, but had been previously in use, or described in some public work, or that he had surreptitiously obtained a patent for the discovery of some other person.

Then the *onus probandi* falls upon the person opposing the patent?—Yes, in the latter mode of trial. Besides those two methods of trying a patent right, it is conceived that a *scire facias* would lie at common law to compel a patentee to show cause why his patent should not be avoided. The patent right might also be tried in Chancery under an application for an injunction.

In the case of a piracy, in which the patentee prosecutes the person infringing his right, is the process for recovering damages easy or not?—It is as easy as to bring to a close any other suit at law.

Is it in America the most common way for a person to attack the patent in a court of law in the way you have described, in order to set it aside, or at once to pirate the invention, and leave the patentee to seek the remedy in a court of law? I think it most general to pirate the invention whenever the patent is supposed to be invalid, but not otherwise; because in that case, if it were a valuable invention, and if it were asol one that was likely to excite public curiosity, or incapable of being secretly put in operation, the patentee would immediately come down upon the invader of his rights with a suit at law, and recover treble damages. Most of the reported cases are suits for infringements.

Are there many cases within your knowledge, where patentees have brought actions and failed in recovering damages?—I am not able to say definitely; five or six, certainly.

Does a patent run over the whole of America, or only over one particular state?—It goes over the whole of the United States.

You state, that for three years it is liable, in the district courts, to be questioned; is a patentee safe after three years?—After three years he would not be liable to be called into court in that way, at the instance of any person who chose to question his rights; but when his patent is infringed, he must either submit to the infringement, or else he must bring it into court; but previously to his patent being granted at all, if there be a conflicting application, the parties would be required each of them, to nominate an arbitrator, the Secretary of State would nominate a third, and it would be left to this arbitration to decide which of the claimants was entitled to the patent.

In trials of patents, are arbitrators ever appointed by the court to settle them?—They may be by consent of parties, but not without the consent of parties; they would examine witnesses, experienced persons, as in other cases.

Does the inventor send in his specification to the Secretary of State finished at his first application?—It is not necessary that he should exhibit his specification to the Secretary of State, except perhaps the form of the documents may make it convenient to annex them altogether.

How long afterwards would it be necessary to lodge the specification?—He may lodge it immediately, as soon as he has got the assent of the Secretary of State that the letters patent should issue; but it is not necessary that the Secretary should know any thing at all of the merits or the justice of the application, he depends entirely upon the allegations of the parties concerned.

How soon can he be compelled by law, after his patent is granted, to put in his specification?—If he does not choose, he may never do it; but after paying the thirty dollars, the patent almost always issues as a matter of course. There is no obligation upon him to furnish any specification, but if he does not, he cannot get his patent.

Is the specification given in before the patent is ratified?—Yes; the Secretary of State of course orders the patent to issue upon the petition and affidavit. It will not however issue, unless the specification be lodged, because the latter is inserted in it, or forms a part of it. There is no obligation to lodge the specification, if the party does not choose to take out the patent. The patent would not be issued without the specification, but the specification must be lodged first.

You have said that a person can obtain a patent in a single day?—Yes, if the papers are completed and approved by the Attorney General.

When he has received the order from the Secretary of State's Office, would that be a protection to him till the patent is taken out?—It would be a protection to him in a certain way, it would secure him against interfering applications. But supposing him to delay a year, during which another person uses the invention, his specification happening not to be lodged in the patent office till the expiration of a year, I should consider that he would not be entitled to any damages for an infringement of his patent during that time, but he still would be entitled to his patent.

What is the usual time that inventors take to make out their specifications?—It varies of course very much according to the complexity or length of the specification.

Does the patent right take effect from the moment the Secretary of State has signified his willingness to grant the patent, tor from the time when the patent is sealed; it runs from the time when the letters patent are dated, at which time they are n a state to be delivered to the patentee.

Supposing an inventor was to delay puttingin hip ci ȝ ficats tion for several years, would the public still be precluded from using the invention ?—Not at all, he would have no patent. It is barely possible that an injunction might be obtained if the delay were unavoidable.

Will you have the kindness to explain, how far a patentee is proected in the interval between obtaining the assent of the Secre ary of State and the completion of his patent, by lodging the specification ?—The answer to a certain degree must be hypothetical, because the patent is almost always completed; and the specification and petition go together, at least they are all furnished at the same time, therefore, practically, I doubt whether I shall be able to answer the question; but as a matter of inference, I should say, that as the patent can have no force previously to its existence, if the completion of the patent were delayed during the interval of delay, the invention might be made use of by any body, unless perhaps specially restrained by an injunction from Chancery.

When the patent is completed, then would the individuals who had availed themselves of that invention, during the interval between the Secretary of State's assent and the completion of the patent, be prohibited from continuing to avail themselves of that invention ?—Decidedly so; the pirate would be precluded from any use of it, because a patent in America, being granted only to the inventor, the right to the monopoly is complete the moment the letters patent issue; and the inventor alone, or his legal representatives, would have a right to make use of the invention.

Can an individual, having obtained a patent, sell that patent to another ?—Yes, and it also descends to his heirs; he may dispose of it to any body without limitation. It is just like any other property. There is a circumstance somewhat material that I would mention, if an inventor dies previously to securing a patent, his heirs, or even his devisees would have a right to take out the patent after his death, in the name of the executor or administrator as trustee.

You have stated that the specification and the petition generally go together ?—They generally go together as a matter of convenience.

But you say that the Secretary of State does not require any description in order to give his consent to a patent ?—He does not require it to be presented to him, but it is lodged in the patent office, which is a branch of his department. As a matter of convenience it generally accompanies the petition; the whole of the writings, prepared by the applicant, are generally on two sheets of paper.

You are perhaps aware, that in England a patent cannot be granted to more than five persons; is there any limitation of that sort in America?—There cannot be five inventors of one thing; but the patent right may be disposed of to any number without limit.

Are American patents granted to foreigners?—If they have resided two years in the United States. A foreigner who has not resided two years, cannot get a patent as a matter of course, under the patent law; but Congress has the power of dispensing with the two years residence by special act.

Are persons taking out a patent in America, under any condition, that they shall not take out a patent in any other country?—Not at all.

Supposing that several months elapsed before the specification was put in, and the patent completed, have other persons power by obtaining access to the patent office, of knowing what the inventor is about?—A person would have the same means of discovering it that he would have of discovering the business of any other office, but it is not open to the public; I dare say there would be no particular secrecy made use of on the subject; but still it is not customary to make applications at the patent office, with the view of crossing the purposes of the inventor, because there cannot often be two persons claiming patents as inventors of the same thing. The principle as I have remarked before, of the American patent law, is somewhat different from that of England. It is granted there as a reward to the inventor. Here a patent is granted as a reward to any person for bringing the invention to the knowledge of the public, whether he be the inventor or not.

In what part of the United States is a patant right tried?—It is tried where the patentee resides, if he is to be called upon to shew cause why his patent should not be avoided, but it may be where either party resides in other cases.

If the patentee brings an action for an infringement of the patent, is it at the option of the patentee where it shall be tried?—It must be tried at the place where the person sued resides.

Is there any mode by which an English patent can be afterwards patented in America?—Not if it has been known or used here. There is a peculiarity in the patents granted to Americans. They are not required to make affidavit that the invention has never been made known or used in any foreign country. A foreigner is obliged to make that oath, but an American may be presumed, of course, to have originated all his inventions within his own country. It is probably, however, an accidental difference between the two oaths.

Is he allowed to get a patent for an invention from a foreign

country which he has not himself invented?—He cannot get a patent for it. There are no patents of importation.

He is obliged, in all cases, to swear that he is the inventor? —Yes.

Supposing an Englishman were to invent something that he believed would be particularly useful to the United States, must he go to America in order to take out a patent for it?—He must go and reside there two years before he could obtain a patent as a matter of course, but by petition to Congress he might probably have the two years residence dispensed with. Foreigners have obtained special acts of the legislature, directing patents to issue for them even when they have not resided at all in the United States. An instance in point is that of Brown's gas engine, but that was the last; and a member of Congress, who had been upon the committee that brought in the Bill, said the dispensation was granted under a misapprehension that the petitioner was residing in the country.

How long ago was that?—Four or five years.

You have stated, that the specification is usually open to the public, are there any cases in which the legislature interferes to require it to be kept secret?—None.

Supposing the invention is not used for a great number of years, does the party lose his patent?—No, his patent is good for the fourteen years; he is not required to carry it into use at all. It is probable, that if he were to commence an action against a person for an invasion, he would, in that case, get very little damages. That being the natural course I suppose, it is considered not to require any particular provision.

Are patentees in America in the habit of granting licenses to persons to work the invention?—It is very common.

Are they obliged, if they grant it to one person, to grant it to others?—No; it is entirely optional.

Do you know whether licenses are sometimes granted to particular parties, on condition that they shall not be granted to others?—I am not aware of any circumstance of that kind.

Can you state whether, from the cheapness of patents in America, a very great number are taken out?—About two hundred annually.

Is the number found to be any inconvenience; is there any complaint of the number of patents that are taken out?—Not at all.

You have stated, that thirty dollars is paid on the first application; is that the whole expense of the patent?—That is the whole expense. The party may possibly go to a lawyer to have his petition drawn up, and to have his papers put in order, for which the highest rate of compensation there is about 4*l*. 10*s*.; so that the whole expense of a patent would seldom

exceed about eleven or twelve pounds; the thirty dollars is all the official expense.

If a person makes an improvement upon his original invention, must he take out a uew patent for that?—Yes; he cannot add that to his old patent.

After the patents are taken out, are they placed in any office of record, where every one has access?—Yes; and they have also a model office, which is at present a respectable museum, where all machines are deposited.

In most cases where a patent is taken out for machinery, is a model deposited?—Yes.

In chemical processes, what is done?—In chemical processes they give the different ingredients whenever they are required; and those are deposited in the same way.

Where patents are granted for chemical inventions, is any experiment made to know whether the result can be produced? —No; unless the head of the patent office chooses to do it for his own amusement.

Supposing he does, and finds that the thing does not answer, would the patent be refused?—If any person choose to call upon the patentee, to shew cause why his patent should not be avoided, on the ground that it did not answer the purpose suggested in the specification or petition, the patentee would be obliged to prove that it did so.

That is a process in a court of law?—Yes.

Attended with the same expense that any other action at law is?—It is a little more summary; a motion is made, on affidavit, to the court, and a notice issues to the party, at the discretion of the judge, to appear and show cause; and upon solemn argument, or in case the patentee fail to appear and shew cause, the rule may be made absolute, and the patent declared void.

Is there any complaint made of the incompetency of the courts, in some cases, to try those queseions of patent rights? —I am not aware of that; the patent law prescribes the remedies. It is a matter regulated by statute, and of course the section of the law would indicate at once whether the court had jurisdiction or not.

As very often questions must arise, in which a considerable degree of science is required, to ascertain whether there has been an infringement or not, or whether the invention is a new one or not, have you ever heard it said that juries and judges are incompetent to try those questions?—I have not heard much complaint upon that subject; but I have some slight recollection of a cause that was tried in that way, and I remember very well that the counsel acknowledged their own incompetency.

In case it is attempted to set aside a patent, can such a prosecution be brought more than once by any party?—I do not think there is any legal provision against that; the party who had failed the first time, would of course again be saddled with costs if he failed the second time. The expense is the only general remedy against it.

Mr. *John Isaac Hawkins*, called in; and Examined.

Have you any information to give to the Committee with regard to the Spanish law of patents?—I have read over the Spanish patent law, and extracted the only points which I think require any consideration. They are contained in a law passed by the Cortes on the 2d of October 1820, and which was sanctioned by Ferdinand the 7th, on the 14th of October 1820, and they are as follows:—The inventor of a new machine or process is entitled to a patent for ten years. The improver of an old machine or process can only have a patent for six years; and the importer of a foreign invention only five years. An act of the Cortes can extend the period, in particular cases, not exceeding in the whole, fifteen years to the inventor, ten years to the improver, and six years to the importer The whole expense of the patent is, to the inventor 2,000 reals, to the improver 1,200 reals, and to the importer 1,000 reals. One half to be paid at the time of petitioning, the other half on receiving the patent; the specification to be presented at the time of petitioning. The specification is open to public inspection, except in particular cases at the discretion of the government. Any number of partners may hold and work a patent. If the Committee should wish for further information upon this subject, I would beg leave to refer them to a work, intituled, "*Traite des Brevets d'Invention, &c.* By Augustin Charles Renouard," which was published at Paris, in the year 1825. There is one point in this Spanish law which I would beg leave to make an observation upon, which is the provision giving different periods to different classes of applicants. It appears to me next to impossible to distinguish between an inventor and the improver of an old invention, and therefore I think such a distinction would create a great difficulty; but there is a broad distinction between an inventor and the importer of a foreign invention, and it might be worthy of consideration, whether a difference of period should be made between the inventor and the importer of a foreign invention.

Conclusion of Evidence in the House of Commons on the Laws of Patents.

New Patents Sealed.

To Henry Calvert, of the city of Lincoln, Gentleman, for his having invented or found out an improvement in the mode of making saddles, so as to avoid the danger and inconvenience occasioned by their slipping forward. —Sealed 26th October, two months for Inrolment.

To Jeffrey Shores, of Blackwall, in the county of Middlesex, boat builder and ship smith, for his having invented an improvement or improvements on tackle and other hooks, which he denominates the self relieving hooks.—1st November, 2 months.

To John Collinge, of Lambeth, in the county of Surrey, engineer, for his having invented an improvement or improvements on the apparatus used for hanging, or suspending the rudders of ships or vessels, of different descriptions.—1st November, six months.

To Benjamin Cook, of Birmingham, in the county of Warwick, brass founder, for his having invented an improved method of making a neb or nebs, slot or slots in shells, or hollow cylinders of copper, brass, or other metals, for printing calicoes, muslins, cloths, silks and other articles.—1st. November, 6 months.

To Lewis Aubrey, of Two Waters, in the county of Herts, engineer, for his having invented certain improvements in cutting paper.—1st November, 6 months.

To John Bowler, of Castle Street, Southwark, in the county of Surrey, hat manufacturer, for his having invented certain improvements in machinery employed in the process of dying hats.—4th November, 2 months.

To Joel Benedict Nott, late of Schenectady, in the State of New York, but now of Bury Street, St. James's, in the county of Middlesex, Esq. in consequence of a communication made to him by a certain Foreigner, residing abroad, for an invention of certain improvements in

the construction of a furnace or furnaces for generating heat, and in the apparatus for the application of heat to various useful purposes.—4th November, 6 months.

To Thomas Bramley, Gentleman, and Robert Parker, Lieutenant in the Royal Navy, both of Mousley Priory, in the county of Surrey, for their having invented certain improvements on loco-motive and other carriages, or machines applicable to rail and other roads, which improvements, or part, or parts thereof, are also applicable to moving bodies on water and working other machinery.—4th November, 6 months.

To Alexander Bell, of Chapel Place, in the borough of Southwark, engineer, for his having found out or invented certain improvements in machinery for removing wool or hairs from skins.—4th November, 6 months.

To Augustus Whiting Gillet, of Birmingham, in the county of Warwick, merchant, in consequence of a communication made to him by George Bridgman, a Foreigner residing in New Haven, Connecticutt, in the United States of North America, for a certain invention of an improvement in the construction and application of wheels to carriages of pleasure, or of burden, or to machines for moving heavy bodies.—4th November, 2 months.

To George Givinett Bompas, of Fishponds, near Bristol, Esq. M. D. for his having invented an improved method of preserving copper and other metals from corrosion or oxydation.—4th Nov. 6 months.

To Joseph Gibbs, of Crayford, in the county of Kent, Esq. for his invention of improvements in evaporating fluids applicable to various purposes.—6th November, 6 months.

To John Hall the younger, of Dartford, in the county of Kent, engineer, in consequence of a communication from a Foreigner residing abroad, for a machine upon a

new and improved construction, for the manufacture of paper,—9th November, 6 months.

To George Minter, of Princess Street, Soho, in the county of Middlesex, upholsterer, cabinet, and chair manufacturer, for his having invented an improvement in the construction of or making or manufacturing of chairs, which he intends to denominate Minter's reclining chair. —9th November, 2 months.

To Henry Pratt, of Bilson, in the county of Stafford, miller, for his having invented certain improvements in the making and manufacturing of quarries, applicable to kilns, for drying wheat, malt and other grain, and to various other purposes.—11th November, 6 months.

To Sir Thomas Cochrane, Knight, commonly called Lord Cochrane, of Regent Street, in the county of Middlesex, for his having invented an improved rotary engine to be impelled by steam, and which may be also rendered applicable to other purposes.—11th November, 6 months.

To Charles Stuart Cochrane, of Great George Street, in the city of Westminster, Esq. in consequence of a communication made to him by a certain Foreigner residing abroad, for certain improvements in the preparing and spinning of cashmere wool.—13th Nov. 6 months.

To John Tyrrell, of Saint Leonard's, in the county Devon, Esq. barrister at law, for his having invented a method and apparatus, for setting sums for the purpose of teaching some of the rules of arithmetic.—13th Nov. 6 months.

To Thomas Sands, of Liverpool, merchant, in consequence of a communication made to him by a certain Foreigner residing abroad, for an invention of certain improvements in spinning machines.—18th Nov. 6 months.

CELESTIAL PHENOMENA, for December, 1830.

D.	H.	M.	S.	
1	0	0	0	⊙ before the Clock 10 m. 49 Sec.
5	7	0	0	☾ in conj. with α in Leo
5	19	0	0	☾ in conj. with ρ in Leo
5	0	0	0	⊙ before the Clock 9 m. 14 Sec.
6	15	16	0	☾ in □ last quarter
6	19	0	0	☾ in conj. with σ in Leo
7	10	0	0	☾ in conj. with β in Virgo
8	2	0	0	☾ in conj. with η in Virgo
8	13	0	0	☾ in conj. with 1 γ in Virgo
9	0	0	0	☿ in conj. with β in Oph
10	0	0	0	⊙ before the Clock 7 m. 3 Sec.
12	0	0	0	♄ Stationary
12	8	0	0	☾ in conj. with γ in Libra
12	19	0	0	☾ in conj. with ♃ in Libra
13	11	0	0	☾ in conj. with φ in Oph
14	20	19	0	Eclip. conj. or ● new moon
16	17	0	0	☾ in conj. with d in Sagitt
17	22	0	0	☿ in conj. with λ in Sagitt
20	0	0	0	⊙ before the Clock 2 m. 13 Sec.
20	21	0	0	☽ in conj. with λ in Aquarius
21	7	0	0	☽ in conj. with φ in Aquarius
21	19	0	0	☿ in conj. with σ in Sagitt
21	19	8	0	⊙ enters Capricornus
22	10	42	0	☽ in □ first quarter
24	2	0	0	☽ in conj. with γ in Pisces
24	14	0	0	☿ in conj. with ♃ in Sagitt
25	0	0	0	Clock before the ⊙ 17 Sec.
25	5	0	0	☽ in conj. with μ in Ceti
26	0	0	0	☽ in conj. with f in Taurus
26	17	0	0	☽ in conj. with ν in Taurus
26	20	0	0	☽ in conj. with 1 θ in Taurus
26	21	0	0	☽ in conj. with 2 θ in Taurus
27	2	0	0	☽ in conj. with α in Taurus
28	21	0	0	☽ in conj. with γ in Gemini
29	2	0	0	♂ in conj. with δ in Pisces
30	0	0	0	Clock before the ⊙ 2 m. 44 Sec.

The waxing moon ☽.—the waning moon ☾

METEOROLOGICAL JOURNAL, for October and Nov. 1830.

1830.	Therom.		Barometer.		Rain in inches	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
Oct.											
26	51	41	30,20	29,89	,3	11	48	42	29,56	29,50	,725
27	51	29	30,36	30,14		12	47	35	29,96	29,89	
28	61	34	29,89	29,83	,125	13	50	30	29,81	29,64	,025
29	54	41	29,69	29,64	,1	14	56	40	29,64	29,53	,05
30	46	32	29,99	29,93		15	52	36	29,60	29,50	,25
31	62	34	29,94	29,85	,025	16	55	44	29,33	29,08	
Nov.											
1	59	46	30,05	30,03		17	48	32	29,55	29,40	,475
2	59	43	30,05	30,01		18	44	28	29,84	29,66	
3	57	47	29,89	29,74		19	40	27	30,12	30,09	,05
4	54	43	29,80	29,74	,1	20	47	25	29,96	29,86	
5	55	38	29,86	29,66		21	52	35	29,80	stat.	,125
6	60	47	29,66	29,20	,025	22	48	41	29,91	29,73	,075
7	51	46	29,88	29,11	,825	23	47	35	30,16	30,04	,05
8	48	32	29,74	29,56	,125	24	40	25	30,33	30,30	
9	46	26	29,83	29,79		25	38	24	30,30	30,26	
10	54	34	29,75	29,59							

Edmonton. *Charles Henry Adams*

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXIV.

[SECOND SERIES.]

Recent Patents.

To THOMAS BAILEY, *of Leicester, Frame-smith, for his having invented certain improvements in machinery for making lace.*—[Sealed 5th August, 1829.]

SPECIFICATION.

"MY improvements in machinery for making lace, consist, in certain combinations of parts, to be added to such machinery for making bobbin-net or twist lace, as is commonly known by the name of Lever's single tier hand machinery; and by the aid of my additions the requisite movements are given to all the parts of such Lever's machinery (in the proper order and succession to make lace) by motions derived from one handle or axis, which is turned round with a continuous circular, or rotatory motion, either by the hand of the workman, or by the mechanical power of mill work.

" The structure and operation of Lever's lace machinery being well known to frame smiths, and lace manufacturers, it is unnecessary to describe the same in this Specification; but for the full explanation of my invention, I have hereunto annexed several figures of drawings (see Plate VIII), which represent a Lever's machine with my improvements attached thereto, the parts constituting my improvements being distinguished by letters of reference and shading, and the parts in common use in Lever's machinery being left in outline.

" I shall describe certain alterations, additions, and arrangements which I have made in some of the parts of Lever's lace machinery, in order that it may perform certain parts of its operations with more facility and safety than heretofore, and be thereby better adapted to be worked by means of my combination of machinery, with rotatory motion as aforesaid.

" Fig. 1, is a front elevation of the whole machine; fig. 2, a vertical transverse section of the whole machine; fig. 3, an elevation at the back of the machine; fig. 4, a horizontal plan of a part of my additional machinery detached; and fig. 5, are detached views of other parts thereof. The same letters of reference are used to denote the same parts in all the figures. With respect to dimensions, it must be remarked, that my improvements are intended, for the most part, to be added to the existing Lever's machine now in use, as hand machines; by the term hand machine, I mean that the requisite movements of their parts are given by handles and treadles, which are moved alternately in due order and succession by the hands and feet of the workmen; and my improvements being added, will convert such Lever's machines into rotatory machines, for all the requisite movements will be derived from one revolving handle or axis; it follows, then, that the exact dimensions of the several new parts, which are to be constructed according to my drawings, must be varied, when necessary, to suit the parts of the old Lever's machine to which they are to be applied.

" *Description of the new machinery.*—*A, A, A, A*, is the new framing, consisting of four strong iron bridges, situated side by side, parallel to each other in pairs; one pair at the right hand end of the machine, and the other pair at the left hand, and the bridges *A*, are fastened at their ends by screws to the sect rail, and the lower back rail of the old wood frame, as is shewn in the figures. These bridges support the bearings for the several rotative axes, and the wheel work; viz. *B*, is the horizontal axis to which the first motion is given by a handle or crank *C*, which the workman turns round with a continuous circular motion, when he stands in front of the machine, so that he can see the work it is making. On each end of the axis *B*, a spur wheel *D*, is fixed, in order, by the intermediate wheels *G*, *G*, and the pinions *F*, *F*, to turn the lower horizontal axis *E*, which extends all the length of the machine. The pinions *F*, are fixed, one on each end of the axis *E*, and the intermediate wheels *G*, *G*, turn on fixed stud pins, which are supported by the outermost bridges *A*, *A*.

" By this wheel work the rotative motion that is given by the workman to the handle *C*, is transmitted to the horizontal axis *E*; but the pinions *F*, *F*, having only half as many teeth in each as the wheels *D*, *D*, the axis *E*, is caused to turn round twice for every turn that the workman gives to the crank handle *C*; *H*, *H*, are two pinions that are turned round by the pinions *F*, *F*, which have each the same number of teeth as the pinions *H*, *H*, and the latter are fixed on the extreme ends of two short axes, which are formed into cranks *a*, *a*, at the middle part of each axis, between the pairs of bridges *A*, *A*. On these cranks, two crank rods *b*, *d*, *b*, *d*, are jointed, and the other ends thereof are jointed to pins at the extremities of two short arms *e*, *e*, which are fixed to the front landing bar of the lace machine, in place of the two handles, by which the workman gives motion to that landing bar in the ordinary way of working Lever's machine by hand.

" The incessant continuous circular motion, which is given to the cranks *a*, *a*, by the wheel work *H*, *F*, *G*, *D*, from the crank

handle *C*, is caused by the crank rod *b, d, b, d*, to move the front landing bar backwards and forwards, with a swinging motion about its main joint pins, in the same manner and for the same purpose as is usually done by the workman with his hands, viz. to cause the front and back landing bars, together with the front and back catch bars, and other parts which belong to those bars respectively, to mutually advance towards and recede from the vertical warp threads with equal swinging motions about their joint pins, in contrary directions to each other; that is to say, when the front landing bar and front catch bar are moved away from the warp threads; the back landing bar and back catch bar will also move away from the said threads at the same time, and vice versa; the back bars will approach or return towards the warp threads at the same time as the front bars, such contrary swinging motions being produced by the usual drawing tackle levers and their goose neck rods and half jacks, whereby the front bars are connected to the back bars.

"Such contrary swinging motions of the front and back landing bars is adapted, by the aid of their respective catch bars, to pass the bobbins and carriages through between the warp threads from the front combs unto the back combs, and then from the back combs into the front combs alternately, and by the aid of the racking motion of the guide bar between every such passage, causes the bobbin threads to twist round the warp threads.

"The front and back catch bars are caused by their respective catch bar wheels to drop into the arches or notches of the carriages, at one time into the back notches, and the next time into the front notches thereof, according as the carriages are required to be drawn through into the front combs, or into the back combs; and at the same time that one catch bar is so let fall by its catch bar wheel into the notches of the carriages, the opposite catch bar is lifted up clear out of the opposite notches of the carriages, by its own catch bar wheel, and so on, all the aforesaid parts operate in the well known manner of Lever's machine, until the carriages have been passed three times

through, between the warp threads, and have thereby completed the operation of twisting the bobbin threads around the warp threads for a course, or half mesh.

"To accomplish that twisting by my improvements, the crank handle *C*, must be turned by the workman one and a half turns, and the crank *a*, will then have made three turns, and will have passed the carriages three times through between the warp threads.

"To effect the dividing of the carriages into two divisions, by the front and back dividers, for the purpose of crossing the bobbin threads, I cause the front and back landing bars to stop short of approaching so near towards each other, as they do at those times when all the carriages are required to pass in one row. I produce that stopping short of the said bars without any interruption of the continuous circular motion of the cranks *a*, *a*, by causing the crank rods *b d*, *b d*, to lengthen or extend themselves out to a greater length than usual at that period, when the carriages are to be divided into two divisions by the aid of the front or back dividers, but as soon as the division is effected, the said crank rods are caused to shorten again, and resume their usual length, so that they will not move the landing bars any further outwards from the warp threads than their accustomed distance, that is, as far as is necessary to draw the two divisions of the carriage quite into the front and back combs respectively, so as to be clear of the warp threads.

"In order that the said crank rods *b*, *d*, *b*, *d*, may be capable of lengthening as aforesaid, I make each rod of two bars of metal *b*, and *d*, placed flat one upon the other, and united together by screws which pass through oblong slits in one bar, and are screwed fast into the other bar, so as to admit of one bar sliding freely upon the other bar, for a short distance, in the direction of their length. The joint at the lower end of each crank rod, by which it is united to its crank *a*, is formed at the end of the upper of the two bars, and the other joint at

the upper end of each crank rod, by which it is united to the short arms *e*, of the front landing bar, is formed at the end of the lower of the two bars; *d*, *f*, is a stud fixed to the lower bar *d*, of each crank rod, by a shank which passes through a slit in the upper bar *b*; the studs *f*, in the two crank bars, form a support to a horizontal sliding bar *g*, which rests upon them so as to be moveable in the direction of its length, through a short distance; it is guided by screws which pass through slits in each end of it, and are screwed fast into the studs *f*.

"At each end of the sliding bar *g*, is a permanent wedge, rising up from the upper or front side of the bar. When the bar *g*, is slid as far as it can go to the right hand, those wedges introduce themselves beneath the points of two gage screws *h*, which are screwed fast through the bends at the ends of the upper bars *b*, of the two crank rods *b*, *d*, and when the said wedges are so introduced beneath the points of the gage screws *h*, the crank rods are thereby contracted to their shortest length, and are as firmly retained at that length, as if they were each formed of one bar, or as if the two bars *b*, and *d*, of each rod were firmly screwed together, so as to have no sliding motion; but when the sliding bar *g*, is moved or slid endways as far as it can go towards the left hand, then the prominent wedges at each end of it are carried away from beneath the points of the gage screws *h*, and permit the same to approach towards the studs *f*, whereby the rods are left at liberty to lengthen or extend themselves out as much as is permitted by the slits for the screws which unite the two bars *b*, and *d*, of each rod together.

"The extension of the two rods is produced as soon as the wedges are withdrawn, because the machine springs, which are applied in the usual manner to overbalance the front and back landing bars, always draw the said bars away from the warp threads, so that they will not approach thereto, unless the crank rods *b*, *d*, oblige them to do so; consequently when

those crank rods (by the removal of the wedges at the ends of the sliding bar *g*,) are capable of lengthening out, they will not compel the landing bars to approach so near to each other as those bars must do, when the said wedges of the sliding bar *g*, are interposed beneath the points of the gage screws *h*, so as to retain the crank rods to their shortest length.

"The sliding bar *g*, is drawn endways towards the right hand by a spring which always tends to bring the wedges at the ends of the bar *g*, beneath the gage screws *h*, and it is moved endways towards the left hand by the following means, when required to disengage the wedges:—

"The right hand end of the sliding bar *g*, abuts endways against a piece *k*, figs. 1 and 4, which is moveable about a centre pin fixed into the upper bar *b*, of the right hand crank rod. The piece *k*, applies obliquely across the end of a horizontal lever *l*, which is situated against the inside of the upright legs of the wood frame, being poised by its middle upon an upright fixed pin, which is supported by some part of the fixed frame, and the opposite or back end of the lever *l*, which is connected by a short horizontal link *m*, with the back end of another similar horizontal lever *n*, which is situated at the outside of the upright legs of the wood frame, and is poised by its middle on an upright fixed pin, supported by that frame. The front end of the lever *n*, passes under the guide bar wheel, which is mounted on the upright spindle, as usual in Lever's machines, and the end of the lever *n*, is acted upon by two pins which are fixed into the guide bar wheels, or else into an extra wheel fixed on the upright spindle, so as to project downwards from the under surface thereof; the said parts *n*, *m*, *l*, *k*, and *g*, are suitably combined and arranged, in order that one or other of the said pins in the guide bar wheel shall, at the proper moment for dividing the carriages, come in contact with the front end of the lever *n*, and move the same away from the upright spindle of the wheels, (viz. towards the left hand) and that motion is transmitted by the link *m*, the lever *l*, and the piece *h*, to the

sliding bar *g*, so as to force the same endways towards the left hand, in opposition to its spring, and thereby the wedges at the end of the bar *g*, are removed from beneath the points of the gage screws *h*, in order to leave the crank rods at liberty to lengthen out, as before stated.

"The wheels on the upright spindle are moved round one tooth, in the usual manner of Lever's machines, by the driver, which acts in the teeth of their ratchet wheel, every time when the landing bars arrive at their greatest extension or departure from the warp threads, and it is then that the aforesaid wedges are removed, in the manner above described, from beneath the points of the gage screws *h*, in order to set the crank rods at liberty to lengthen out, which liberty being given to them, the front landing bar being overbalanced by its springs, will not begin to be moved towards the warp threads until the lengthening of the crank rods has taken place, and after that the crank rods, in their lengthened state, will draw down the front landing bar towards the warp thread, but not so near thereto as is done at other times, when the crank rods are returned at their shortest length, for the landing bars and catch bars will stop so much short of the distance to which they usually approach towards the warp thread, as will permit the edges of the front and back catch bar, to drop into the back and front notches of the carriages respectively, after those carriages are divided into two divisions by the action of the dividers, which takes place when the crank rods are lengthened as aforesaid, and at the instant when the landing bars are approached as near towards the warp threads as they can be approached while the crank rods remain so lengthened.

"The dividing of the carriages into two divisions by the action of the dividers, is effected in the following manner:—When the machine is worked according to my improvements, and the same is a little different from the usual course of dividing in Lever's hand machines, owing to the circumstance that my improvements do not cause the landing and catch bars to

approach so near to each other (or to the threads) at the time when the division is to be effected as at other times, when all the carriages are intended to be passed through in one division; whereas in the usual manner of working Lever's machine by hand, the landing and catch bars are always put down towards each other to the same distance, and for dividing they are withdrawn again a little, in order to separate them from each other as much as is necessary to allow the edges of the two catch bars to drop into the front and back notches of the carriages respectively, after they are divided into two divisions; according to my improvements, the dividing of the carriages is performed by one set of dividers acting at a time, viz. by the back dividers being chiefly operative when the carriages are to be divided in coming through out of the back combs into the front combs, and by the front dividers being chiefly operative when the carriages are to be divided in going through out of the front combs into the back combs.

"For instance, to divide when all the carriages are in the back combs and coming forward, the carriages stop short before they arrive at the central position, in consequence of the lengthening of the crank rods, and at the same period the front points are descending by means of other parts of my improvement, to be hereafter described, in order to take up the work. In so descending, the front points lift up the back catch bar, by its connection with the arm which projects out from the front spindle bar in the usual manner; and the edge of that catch bar is thereby raised out of the notches of the carriages, leaving them all at liberty; and also in descending, the front points draw up the tie lever at the back of the machine in the usual manner, and that raises the tail of the back dividing bar, so as to bring that bar forwards, whereby the ends of the dividers overtake every other of the carriages, viz. those which are to become the front division, and push them forwards, without disturbing the intermediate carriages, which are to become the back division. When the carriages of the front division are

pushed so much forwards by the back dividers as to pass beyond the central position, until their front notches will be exactly beneath the edge of the front catch bar, that bar is let fall into the said notches by the usual means, viz. by the back dividing bar pushing the driver for the front catch bar, when so pushed forwards as to turn the said wheel round far enough to let the catch bar drop.

"By the time that the division is thus effected, and the front division of carriages is locked by the front catch bar, the front points having entered amongst the threads, will begin to go up again to take up the work in the usual manner; and in so doing they let down the back catch bar in the usual manner, so as to allow the edge of that bar to drop into the back notches of the back division of the carriages; also as they go up, the points let down the tie lever, which, by relieving the tail of the back dividing bar, allows that bar to move back again by its spring, as usual.

"The two divisions are thus locked at back and front respectively, and as the landing bars recede from the warp threads, the two divisions will be drawn out from between the warp threads; one division into the back combs, and the other into the front combs, as usual.

"To divide the next time when all the carriages are on the front combs, and going backwards, they stop short before they arrive at the central position, as before stated, and the front catch bar is lifted up out of the notches of the carriages by its catch bar wheel in the usual manner; the back points then descend, to take up the work. In so descending they lift up the back catch bar, by the usual connection with the short lever that projects out from the back spindle bar, and the back points in their descent, and also cause the front dividing bar to move back towards the carriages by the following means:—

"An arm *K*, is fixed to the back spindle bar (for the back points), and projects out forward therefrom; the end of it is connected by a link *p*, with the back end of a lever *q*, which is

poised by the middle on a fixed pin, supported by a bracket rising up from the cross bar; and the front end of the same lever is connected by a rod *L*, with a short bent lever *M*, which moves on a fixed pin, that is supported by the front landing bar, and the end of the lever *M*, projects outwards before the front dividing bar in such manner that when the back points descend, and draw up the rod *L*, the latter will move the front dividing bar backwards towards the carriages. In so moving, the ends of the dividers take the edges of those carriages which are to become the back division, and push them back, without disturbing the other intermediate carriages. The carriages of the back division are thus pushed back by the front dividers, beyond the central position, until their back notches come exactly beneath the edge of the back catch bar, which bar is at that instant let down into those notches, by its usual connection with the short lever of the back spindle bar and the going up of the points.

" By the time that the division is thus effected, and the back division of carriages is locked by the back catch bar, the back points having entered amongst the threads, will have taken up the work in the usual manner; and in so doing, they cause the front catch bar to drop into the front notches of the carriages of the front division, by the usual connection with the driver of the front catch bar wheel, turning that wheel a little further round, and the back points going up a little further; and they also allow the front dividing bar to come forwards away from the carriages, by releasing the parts *K*, *p*, *q*, *L*, *M*, before described. The two divisions of carriage are thus locked at front and back respectively; and as the landing bars recede from the warp threads, the two divisions will be drawn one into the front combs, and the other into the back combs, as usual.

Here it is to be observed that in my mode of effecting the division (by stopping the landing bars short before they have moved the carriages to the central position), the carriages by the dividers, are always in that direction in which the carriages

are required to move, after the division is made, and no more motion is given to the carriages in the act of dividing them than is absolutely necessary, for only one of the division of carriages is moved by the dividers at each time—the other division standing still in the combs.

"The upper end of the rod *L*, is not joined to the front end of the lever *q*, but the rod merely passes through a hole in a socket, at the end of the lever, and a thumb nut, which is screwed on the top of the rod *L*, comes to bear on the socket whenever the lever *q*, is required to draw up the rod, in the act of dividing, as before described. But when the front landing bar comes forwards in the regular course of working, and the front dividing bar comes with it, the rod *L*, moves freely upwards through the hole in the socket at the end of the lever, without giving any motion to that lever.

"*To give motion to the points*, in order to take up the work, two wipers *P*, *Q*, are fixed upon the middle part of the length of the lower horizontal axis *E*, and revolve therewith; they are adapted to act (when necessary) upon rollers at the ends of two treadles *R*, *S*, the horizontal axles *T*, *V*, of which are supported in sockets at the back of the frame. The right hand treadle *R*, is to give motion to the front points, and the left hand treadle *S*, is to give motion to the back points, by means of upright rods, which extend as usual from each of those treadles, to the front ends of the working levers at the upper part of the machine; and the opposite or back ends of those levers are connected by links with the back arms of the spindle bars, in order that when either of the treadles *R*, or *S*, is pressed down, the point bar belonging thereto may also be brought down, in the usual manner of a Lever's machine; and when the said treadle is relieved, the points will be carried up again by their back springs, in the usual manner.

"When the machine is worked by my improvements, the revolving wipers *P*, *Q*, act at proper intervals (in lieu of the feet of the workmen) to press down the treadles *R*, or *S*, by

acting on the rollers thereof. But those wipers must not act on the treadles every time that they turn round; therefore the horizontal axes *T*, *V*, on which the treadles are fixed, are moved endways in their sockets, in the direction of their length, in order to remove the rollers at the end of the treadles *R*, or *S*, so much sideways out of the circular paths in which the wipers *P*, *Q*, revolve, that those wipers in their revolution with the horizontal axis *E*, will miss the said rollers, and produce no action on the treadles, unless the horizontal axis of that treadle which is to be operated upon is first moved endways, so much so as to bring the roller at the end of that treadle into the path of the corresponding wiper, which wiper will then, in the course of its revolution, press down that treadle, and actuate the points belonging thereto, in the same manner as in Lever's hand machines, when the workman presses down the treadle with the foot.

"The horizontal axles *T*, and *V*, are thus moved endways by the following means, every time that the points are required to be put in action:—*W*, is a ratchet wheel, with eight teeth, fixed on one end of a horizontal axis *x*, which turns in suitable bearings, supported by the frame at the back of the machine; *w*, is a driver, joined to one of the drawing tackle levers in a suitable manner, to move the wheel *W*, round, one tooth every time that the carrier bars are extended, and consequently at the same time as the guide bar wheels are moved. *X*, is a wheel fixed on the axis *x*, and turning with it; *s*, is a lever applied horizontally above the wheel *X*, and *t*, another similar lever applied horizontally beneath the wheel *X*. The back ends of the two levers *s*, and *t*, are moveable about fixed centre pins, which are supported by a suitable brace from the frame, and each lever *s*, and *t*, carries a small roller near the middle of its length, to apply against the circular edges of the wheel *X*. The front ends of the two levers *s*, and *t*, are connected by two upright rods with the short arms of two bent levers *Y*, *Z*, which are poised by their middles upon fixed

centre pins supported by the frame, and the lower ends of the two levers *Y*, *Z*, apply to the extremities of the two horizontal axes *T*, *V*, of the treadles *R*, *S*.

"The two axes *T*, *V*, are always urged endways, one towards the other, by a horizontal spring *y*, the two ends of which are fastened to two hooks, one projecting out of the end of one axis *T*, and the other out of the end of the other axis *V*; the action of the spring *y*, also urges the rollers of the levers *s*, and *t*, towards the edge of the wheel *X*. A notch is cut out in one part of the circumference of the wheel *X*, large enough to admit one or other of the rollers of the levers *s*, or *t*, into the notch, when it is turned towards either of them, but so long as the said rollers bear upon the circular edge of that wheel, the lever *s*, is thereby borne upwards, and the lever *t*, is borne downwards, in opposition to the action of the spring *y*; and so long as that is the case, the two upright rods by which the ends of the levers *s*, and *t*, are connected with the upper arms of the bent levers *Y*, *Z*, being adjusted to a suitable length, will cause the lower ends of the said levers *Y*, *Z*, to keep the horizontal axes *T*, and *V*, removed so far endways one from the other, that the rollers of the treadles *R*, and *S*, will stand beside of the respective circular paths in which the wipers *P*, *Q*, on the horizontal axis *E*, revolve.

"When the time arrives for the carriages to be divided, the notch in the wheel *X*, will, by the progressive motion of that wheel, present itself to the roller of the upper lever *s*, if it is that time when the front points are to operate, or else to the roller of the lower lever *t*, if it is that time when the back points are to operate. And then the spring *y*, being no longer counteracted, will move that axis *T*, or *V*, of the treadles, whereof the lever *s*, or *t*, is set at liberty, by its roller entering into the notch of the wheel *X*, and the motion so given to the axis *T*, or *V*, by the spring *y*, will bring the roller of its treadle *R*, or *S*, into the path of the corresponding wiper *P*, or *Q*, and then as that wiper comes round in its circular path, it

will press down that treadle, and thereby give motion to the points belonging to it at the proper moment, and in the proper manner, as is usually done by the foot of the workmen in Lever's hand machines. And after the said wiper *P*, or *Q*, has passed by the roller of the treadle, and allowed the same to return, and consequently allowed the points to be carried up by their back springs, then the driver *w*, (which turns the ratchet wheel *W*, round one tooth every time the landing bars are extended), causes the notch in the wheel *X*, to move away from the roller of the levers *s*, or *t*, and that wheel presenting its edge to the said roller, causes the said levers *s*, or *t*, by its connection with the bent lever *Y*, or *Z*, to force the axis *T*, or *V*, of that treadle *R*, or *S*, which has just been operated upon so much endways in opposition to the spring *y*, as will remove the roller of that treadle sideways out of the circular paths of that wiper *P*, or *Q*, which operated last time, so that the said wiper will produce no effect the next time it comes round. And in that manner the parts will remain until the carriages have been passed three times between the warp threads, and then at the fourth time when the carriages are to be again divided, the ratchet wheel *W*, having been turned a tooth each time, will have gone half round, so as to present its notch to the roller of the opposite lever *s*, or *t*, to that which was set at liberty at the last time of dividing, and thereby the other treadle, and wiper, and points, which stood still the last time of dividing, are brought into operation, and those which then operated, now stand still, and so on.

" And further, by way of safeguard, to keep up the points to their proper places in the meshes of the lace after they have taken up, I fix two wheels 1, and 2, upon the horizontal axle *x*, before described, and I place a horizontal lever 3, and 4, beneath each wheel. The levers 3, and 4, are moveable about fixed centre pins at their back ends, those pins being supported by suitable brackets from the frame. Each lever 3, and 4, has a roller near the middle of its length, to apply to the edge of

its wheel 1, or 2, and there is a connecting link 5, and 6, from the front end of each lever 3, and 4, up to the back arms of the spindle bars for each set of points. Each wheel 1, and 2, has a notch in one part of its circumference to admit the roller of its lever 3, or 4, at the time when the points belonging to that lever are to be brought into operation by the combined action of the wheel *X*, and one or other of the wipers *P*, or *Q*, as before described. But when the circular edges of the wheels 1, and 2, apply to the rollers of the levers 3, and 4, they will, by their links 5, and 6, confine the back arms from rising by any accident, and will act in aid of the back springs, which are applied in lieu of the usual back weights, to secure the points from descending until the proper time, and then the notches in the wheels 1, and 2, will (one or other of them) be presented to the rollers of the levers 3, or 4, so as to release the points to which that wheel and lever belongs. The points that are so released, whether back or front (and the time when they are released) will always be the same as those which the wheel *X*, brings into action by one of the wipers *P*, or *Q*, and other means above described.

" Having now described a machine constructed and working according to my improvements, I do hereby declare that what I claim as my invention under the said Letters Patent, is that particular combination of parts, and machinery herein before described (taken as a whole) to be added to Lever's lace machinery, in order to derive from an uninterrupted and continuous circular motion of one handle or revolving axis, all the motions requisite for the several parts of such Lever's lace machinery in due order and succession for making lace thereby. And I do not claim the invention of any particular parts or machinery of which that combination is composed, excepting the crank rods herein before described, which lengthen out together with the parts which occasion them so to lengthen at the proper time, for the dividing of the carriages to be performed in the manner hereinbefore described; for it is by means

of that improvement that I am enabled to give the requisite alternating motions to the landing bars and catch bars, by means of cranks which revolve incessantly without stopping And in particular, I do not claim the application of revolving cranks to give alternating motions to the bars of Lever's machinery, the same having been applied heretofore; but not in such manner as to avoid stopping or suspending their motion whilst the dividing and taking up is performed.—[*Inrolled in the Inrolment Office, February*, 1830.]

Specification drawn by Mr. J. Farey.

To ELIJAH GALLOWAY, *of King Street, in the borough of Southwark, engineer, for his invention of certain machinery for propelling vessels, which improvements are applicable to other purposes.*—[Sealed 2nd of July, 1830.]

THERE are two distinct inventions embraced by this patent, the one is a contrivance by which a rotary motion is obtained from the pendulous action of a vibrating piston within a steam cylinder; the other, a peculiar mode of working a series of moveable paddles connected to a paddle wheel, by means of which the respective paddles are made to enter the water, and leave it in such positions as shall meet the least quantity of resistance from the water in a perpendicular direction.

Plate IX, fig. 1, is a transverse section of a steam cylinder *a, a,* supported by a suitable frame work of iron; *b,* is the axle passing through the middle of the cylinder longitudinally, to which is attached a piston *c,* intended to revolve, or rather vibrate to and fro, in an arc equal to about three fourths of the internal circumference of the cylinder; *d,* is a piece of metal of a wedge form fixed within the cylinder as a steam stop, which limits the extent of vibrations of the piston *c.*

If steam from a boiler be conducted through the pipe *e*, to the valve box *f*, it will pass from the central part of the box through the induction aperture, by the channel *g*, to that part of the cylinder which is on the right hand side of the piston, and by its elastic force the steam will drive the piston towards the left. A crank *h*, (shewn by dots) at the end of the axle, will by the movement of the piston, be also driven toward the left, and carry with it the sliding curved piece *i*, (also shewn by dots), and by means of the jointed connecting rod *k*, *k*, will cause the crank *l*, on the shaft of the fly wheel of the engine to be driven through part of its revolution.

An excentric on the fly wheel shaft has by these means now moved the rod *m*, and shifted the valve *f*, so as to bring the induction aperture opposite to the opening of the channel *n*, when the steam will pass through that channel into the cylinder on the left hand side of the piston, and drive the piston back again to the right, which carrying the crank *h*, and the curved piece *i*, (shewn by dots) also towards the right, by means of the connecting rod *k*, drives the crank on the fly wheel axle round the other half of its circuit. At the same time the turning of the valve *f*, has opened the channel *g*, to the eduction, and the steam on that side of the piston then rushes out of the cylinder, and escapes by the pipe *o*, into the atmosphere or elsewhere.

This is the construction and action of this improved steam engine, in which the vibratory movements of the piston causes the rod *k*, to impel the fly wheel, and hence to propel vessels, or drive other machinery; the crank *h*, and curved piece *i*, shewn by dots, and the rod which connects them to the fly wheel, being the particular feature of novelty claimed by the Patentee.

Fg. 2, is a side view of a paddle wheel for propelling

vessels with five moveable paddles *a, a, a, a, a,* which are mounted on pivots attached to the pentagonal framework; to each of these paddles is affixed, at a certain angle, a tail lever *b, b, b, b, b,* and at the extremity of each of these tail levers, a rod *c, c, c, c,* and *d,* is connected, by a joint: the reverse ends of the rods being attached to a disc *e.* This disc is mounted so as to turn upon a crank *f,* on the main axle of the wheel, and four of the rods *c, c, c, c,* are attached to it by joints, while the fifth, *d,* is made fast thereto by a screw bolt.

If rotary motion be given to the main axle of the wheel, the lower paddle *a* 1, in rising to the situation of *a* 2, will by means of the fast rod *d,* turn the disc *e,* partly round upon the crank; and by that means keep the paddle nearly in a perpendicular position when it quits the water; at the same time all the other paddles will be moved a little, and as they come successively into the water will approach a perpendicular line, and retain nearly the same positions during their propelling strokes until they quit the water.

This contrivance is designed to prevent the inconvenience experienced in paddle wheels with fixed radial paddles, which in entering the water come down upon its surface, almost in a flat position, and rise out of the water in the same way, in one case lifting the vessel out of the water, and in the other depressing it, whereby a great expenditure of power, employed in driving the paddle wheels, is rendered of none effect, and by which useless force the progress of the vessel is rather impeded than facilitated.

Many attempts have been made to avoid the inconvenience, occasioned by the employment of fixed radial paddles, but none of them seem to have been sufficiently simple to answer the purpose, except on still water, nor

does the present plan appear to be exempt from the like objection. A contrivance, which bears some resemblance to this, will be found in the Vol. XI. of our First Series, page 349, under the head Lieut. Hill's Patent.—[*Inrolled January,* 1830.]

To Edwin Budding, *of the Thrupp, in the parish of Stroud, in the county of Gloucester, Machinist, for his having invented a new combination and application of machinery, for the purpose of cropping or shearing the vegetable surfaces of lawns, or grass plats of pleasure grounds; constituting a machine which may be used with advantage, instead of a scythe for that purpose.*—Sealed 31st August, 1830.]

This machine is constructed something like a horse hoe, that is it moves forward upon wheels or a broad roller, and is guided by handles held by the person who conducts it. At the front there is a fixed straight edge or blade of steel, which is brought in contact with the ground, that is as low as the grass will allow, and against this straight edge there is a cylinder or drum with twisted cutting blades, or knives, which are driven round as the machine advances, by a train of toothed wheels, actuated by the running on carriage wheels, which cause the rotary blades to act as they revolve against the fixed blade and constitute shears, like the improved cutters of a machine for cropping woollen cloth upon the rotatory principle. The construction of the machine is shewn Plate IX.

SPECIFICATION.

"Figure 3, is an elevation of the left side, and figure 4, a ground plan of the machine, the same letters refer-

ing to the same parts in both figures; *a, a,* is the cast iron frame; *b,* and *c;* are two wrought iron bars with screws at their extremities for connecting the opposite sides of the said frame; *d,* is a hollow cylinder or drum of cast iron, fixed on the horizontal axis *e,* having its bearings in the under edge of the frame *a, a,* and *f,* is a toothed wheel fixed on the same axis *e,* to drive the pinion *g,* when the drum *d,* is made to roll on the ground; *h,* is a horizontal wrought iron axis, turned round by the said pinion *g,* when the machine is in action; *i,* is a toothed wheel fixed on one end of the axis *h,* to drive the pinion *k,* which is fixed on one end of the horizontal axis *l*; three brass rings *m, m, m,* are fixed on this axis *l,* to carry the revolving spiral cutters *n, n,* which are made of thin steel plates, tempered and fixed on by screws, or let into grooves in *m.*

"The number of the said spiral cutters so fixed may be from four to eight or more; *o,* is a rectangular steel plate tempered, having its front edge towards *n,* and a little bevilled like a blunt chisel. This steel plate *o,* is fixed by screws against the under side of the horizontal cast iron bar *p,* which is fixed by its extremities to the sides of the frame *a, a,* at bottom; *q,* is a horizontal solid cylinder of cast iron, having its bearings screwed against the insides of the frame *a, a,* by screws, which pass through chase mortices, in order to allow of an adjustment of the height of the cutting plates *n, o,* above the ground; the whole machine bearing on the cylinders *d, q,* when in action, as well as when at rest.

"A wood handle *r,* is for the right, and *s,* is a similar one for the left hand of the workman. There are bearings *t, t,* for the axis *l,* screwed to the outsides of *a, a,* which screws pass through chase mortices, to allow an adjust-

ment of the edges of *n*, to *o*. Vertical screws pass through projecting parts of *a*, *a*, and bear against the upper and lower edges of *t*, *t*, in order to fix them when adjusted. There is a front horizontal bar *u*, connecting the opposite pieces *t*, *t*; the ratchet wheel *v*, is fixed to the pinion *g*; the sliding gland or box *w*, is fixed by a feather to the axis *p*, with which it therefore always turns, and contains a click or pall, for taking out the teeth of the ratchet wheel *v*, when *w*, is pushed over it by the lever *x*; the centre of motion of this lever is on the bar *b*; a notch in the bar *c*, serves to lock the end of the bent level *x*; when *w*, by acting on *v*, compels *g*, to drive *h*, *i*. The bearings of *h*, are *z*, *z*, which are screwed against the outsides of *a*, *a*, the screws passing through chase mortices, to allow an adjustment of *i*, to *k*, after adjusting the pieces *t*, *t*. When *w*, is moved from *v*, *v*, *g*, will turn loose on *h*, and the machine may be rolled along on *d*, *q*, without communicating motion to the cutters round the axis *l*.

"*Operation of the machine.*—The various parts being adjusted, and the upper end of the lever *x*, placed in the notch, the workman takes hold of the handles, and by pushing forward the machine, the drum *d*, rolls upon the ground like the wheel of a wheelbarrow, at the same time turning *f*, which drives *g*, and *i*; and this wheel *i*, drives *k*, *l*, *m*, making the revolving cutters act rapidly by their smooth outer edges against the edge of the fixed cutter *o*, so as to crop or shear the grass or vegetable surface. At the same time the cylinder *q*, rolls on the ground to regulate the height of *o*, and consequently the closeness of the cutting or shortness of the grass left.

"To keep the roller *q*, sufficiently free from any adhering substances, the horizontal bar *y*, connecting the

opposite pieces, serves as an axis for a thin iron scraper, curved so as to form a portion of a cylinder or arch, having its lower edge bearing on the surface of *q*.

"The speed with which the machine is pushed forward when at work is not material, because the number of cuts will always be in the same ratio with the space rolled over by the drum *d*.

"The revolving parts may be made to be driven by endless lines or bands, instead of teeth. It is advisable to employ the machine when the grass or vegetable surface is dry; and when high grass is to be cut, it is best to shear it twice over, lowering *o, n,* by adjusting previous to the second course or kerf.

"Grass growing in the shade too weak to stand against a scythe to be cut, may be cut by my machine as closely as required, and the eye will never be offended by those circular scars, inequalities, and bare places so commonly made by the best mowers with the scythe, and which continue visible for several days; country gentlemen may find in using my machine themselves an amusing, useful, and healthy exercise.

"I do not claim as my invention, the separate parts of my machine, considered without reference to the effects to be produced by them; but I do claim as my invention, the described application and combination for the specified purpose."—[*Inrolled in the Petty Bag Office, October,* 1830.]

To John Alexander Fulton, *of Lawrence Pountney Lane, Cannon Street, in the city of London, Merchant, for his having invented an improvement in the preparation of pepper.*—(Sealed 20th March, 1830.)

In November, 1827, a patent was granted to the above gentleman, for blanching black pepper, by immersing the berries in water until their external coatings became swelled, and afterwards placing them in heaps for the purpose of their acquiring heat, which caused the skins to rot, and readily peel off, leaving the pepper corn clean and white. The present patent is for accomplishing the same object by mechanical means, which is effected in the following way:—

"Take a quantity of pepper and put it into a mill, constructed, and worked in a similar manner to those used for preparing pearl barley, and similar purposes, except that the inside surface of the case had better to be quite smooth, and to move in a contrary way to the stone.

"The process is to be continued until the whole or greater part of the husks are broken off, when on being separated from the dust and husks, the pepper is sufficiently prepared to be ready for sale or use.

"As my invention consists in removing by *machinery* the husks from pepper, and hitherto the outer husks only have been taken off by chemical processes, I shall consider any means made use of, for the purpose of removing the husks by *machinery*, as an infringement on my patent."—[*Inrolled in the Inrolment Office, September*, 1830.]

To JOSEPH D'ARCY, *of Leicester Square, in the county of Middlesex, Esq. sole executor and residuary legatee of Charles Broderip, late of Spring Gardens, in the parish of St. Martin's in the Fields, in the same county, Esq. deceased, for certain improvements in the construction of steam engines, and the apparatus connected therewith.*—[Sealed 29th November, 1828.]

THE objects of these improvements are, first, to simplify the construction of steam engines, and render them less bulky and ponderous, consequently occupying smaller spaces than engines of similar power upon any of the known constructions; and, secondly, economizing of the steam and fuel, by an improved mode of supplying the steam to work the engine through a steam reservoir separate from the boiler, which is fed by valves worked at intervals.

The first of these objects is effected by the novel construction and adaptation of the piston rod and its appendages, and of a vibration beam; both of which contrivances are shewn in Plate IX.

Fig. 5, is a transverse section of a vessel with a pair of engines erected therein, adapted to propelling. Fig. 6, is a longitudiual section of the same, shewing one of the working cylinders with its air pump and condensor; *a, a,* is the boiler shewn by dots; *b,* the reservoir of steam, from whence the working cylinders *c, c,* are supplied; *d,* is the air pump; *e,* the condensor; *f,* the foot valve; *g,* the discharging valve, and cistern or hot well; *h, h,* are the feeding pumps; *i,* connecting rods for the air pumps; *k,* cranks for working them; *l, l, l,* the paddle wheel shaft, with the main cranks *m, m,* to which the piston rods *n, n,* are connected; *o,* a slider which covers a long slot, or aperture in the cap of the cylinder: through this aperture and slider the piston rod *n,* passes, and vibrates to and fro, moving the slider *o,* with it; *p,* is the piston, which is attached to the piston rod *n,* by a joint *q,* and the piston rod passes through a

ball and socket in the slider *o*. The induction and eduction passages at *r*, *r*, are worked by a slide valve through the agency of a rod, and an excentric, as usual.

Upon this construction an engine may be worked without the intervention of any cross head, side rods, guide frames, or parrellel motion to keep the piston in a perpendicular position while ascending and descending in the cylinder; the improved method of connecting the piston to its rod, by means of a joint, which shall allow the piston to oscillate as the crank moves round, and a ball and socket in the sliding part of the cap or cover of the cylinder, rendering the usual appendages unnecessary.

The slider *o*, forms the most essential feature of this part of the invention; the cap or head of the steam cylinder having a slot or long hole in it for the piston rod to work through, must be covered by a perfectly steam tight joint, and to effect this the slider is made with dove tailed edges at the under part, working in the slot, and sufficiently long and broad on the flat part to cover the slot at all times, as the slider moves to and fro.

It is proposed, under some circumstances, to dispense with this slide, and to affix to the upper side of the piston, a tube as at fig. 7, which shews a section of a working cylinder *c*, *c*, and piston *p*, the rod *n*, being attached to the piston by a joint at *q*, and vibrating as the crank *m*, (to which it is connected) goes round. The tube *s*, *s*, is securely attached to the upper surface of the piston, and moves up and down with it, the sides of the tube being packed perfectly tight against the top part of the cylinder.

The patentee says that this method of using an oscillating piston rod, not only answers very well, but enables him to dispense with the sliding stuffing box, represented in figs. 5 and 6; yet he prefers, for many reasons, the employment of the sliding stuffing box in conjunction with the oscillating piston rod in all double engines. "The benefits and advantages resulting from

an oscillating piston rod, and a sliding stuffing box, are so manifest, that any person conversant with steam engines, will readily admit them, as far as regards their simplicity, efficacy, and saving of room are concerned; and valuable as they are for land steam engines, they are still more valuable in engines employed for navigable purposes."

The improved compound connecting beam is shewn in the representation of part of a boat engine, with horizontal cylinders at fig. 8, the object of which compound connecting beam is to receive motive power from one crank, and convey such motive power to another crank at any required distance; *a*, is the spur wheel shewn by dots, which is put in motion by the rotation of a crank on the main shaft *b*, driven by the piston rod in the way above described. From this main shaft a crank *c*, extends, which is connected by a joint to the compound connecting beam *d*, *d*, *d*. The guide crank *e*, is fixed on a shaft *f*, by means of a pin, to which the centre arm of the compound connecting beam is united; it acts as a guide or stay to regulate, direct and support its movements; *g*, is the shaft of the paddle wheels; *h*, the crank which connects the paddle wheel shaft to the extreme end of the compound connecting beam.

" This compound connecting beam will be found to be a most convenient agent for horizontal marine engines, as it will allow such engines to be fixed lower in any vessel, or boat, and at the same time convey the motion and power of such engines to the shafts of the paddle wheels, at any desired distance from the first point of rotation, which such engines may produce."

The plan for economising steam, and consequently saving of fuel, consists in passing the steam from the boiler into a reservoir or receiving vessel, which is in contact with the boiler, as shewn by dots at fig. 5, and in which vessel the steam is intended to acquire an additional quantity of heat, for the purpose of increasing its elastic force prior to its admission into the working cylinder. The steam is to be admitted into this vessel at intervals, by means of a valve, which is to be opened

by a suitable apparatus connected to the working part of the engine.

The patentee says "The essence of this part of the invention is, in having constructed and applied a valve or valves, cock or cocks, for keeping open and closing the communication when required between the steam receiving vessel and the boiler or boilers with which it is connected; a considerable portion of which steam receiving vessel I insert and enclose in any boiler with which it is united; but in boilers used for marine engines, the chimney which receives the smoke and heated air from all the flues of such boilers, I convey through the steam receiving vessel in a horizontal direction to the greatest convenient distance it will permit, and then the chimney quits the steam receiving vessel in a vertical position, the heated air imparting in its passage through the chimney as much caloric to the steam as it will absorb.

"This receiving vessel is re-filled with steam from the boiler or boilers at every three or more strokes of the engine as may be required, by means of valves, which are opened or closed by suitable machinery, according to the dimensions of such steam receiving vessel, and the capacity of any cylinder or cylinders to be supplied with steam from it. Having by this steam receiving vessel the means of depositing in it any desired quantity of steam, of any required pressure, by the judicious management of any ordinary throttle or intermediate valve, the same will regulate the supply of steam to the cylinder or cylinders in such manner as shall effect the greatest possible saving of steam in reference to the resistance on such piston or pistons of such cylinder or cylinders.

"I do not claim as the invention of the said Charles Broderip, the introduction or use of a steam receiving vessel, nor of any of the apparatus for regulating the quantity of steam to be admitted into a steam cylinder or cylinders, by means of throttle and other valves being placed between the receiving vessel and steam cylinder of any engine, because

am aware that these contrivances and expedients have been used with more or less effect. My improvement upon these contrivances is the introduction of valves or cocks to supply the steam receiving vessel from the boiler or boilers; and when this is effected, then to close and shut off, by the agency of the steam engine, the communication between the boiler or boilers and the steam receiving vessel, and to open and close the communication at any desired and stipulated period. I prefer the particular description of valve and apparatus described, although other cocks, slides, or valves may accomplish the desired object with more or less effect; but it is the expedient of placing any suitable apparatus between the boiler and the steam receiving vessel, with confident means to open and close the communication between them at any stipulated period, or for any stipulated time, that constitutes the leading feature of this part of the invention."—[*Inrolled in the Inrolment Office, May,* 1830.—*N. B. Eighteen months were allowed for the inrolment of this specification.*

Specification drawn by Mr. A. Galloway.

To George Stocker *and* Alexander Stocker, *both of the parish of Yeovil, in the county of Somerset, Gunsmiths, for their invention of a cock for drawing liquor from casks, which produces a stop superior to that which is effected by common cocks, and will continue in use for a longer period of time.*—[Sealed 26th January, 1830.]

This invention is said to consist in causing the passage for the liquor through the cock, commonly called the way of the cock, to be opened or shut by means of a *conical plug*, rising from, or descending into, as the case may be, a conical part of the said passage or way. Thus far the intention of the patentees appears evident enough, but on looking to the rude

figure which as a drawing, is appended to the specification for the purpose of further explaining the invention, we are scarcely able to comprehend its construction. The plug is enclosed within a socket, and consequently is to be turned by a key; there appears to be a worm round the socket, in which some pieces, extending from the stem of the plug are to work, and as it turns, carry the plug up or down. The plug itself is said to be conical, but not so represented, and the recess into which it is to descend must be conical also, but does not appear so in the figure.

The plug is to be made of wood; yew tree is thought to be the best, "but it may be made of metal, leather, or any other suitable composition, provided that the substance used be softer than that of the conical passage into which it fits."

The patentees say, " now whereas we claim as our invention the method hereinbefore described of opening and shutting the passage for the liquid or way of the cock, by means of the conical plug, and conical part of the passage; and such our invention being to the best of our knowledge and belief entirely new, &c."—[*Inrolled in the Petty Bag Office, March,* 1830.]

To Reni Florentin Jenar, *of Bunhill Row, in the parish of St. Luke, and county of Middlesex, Gentleman, for his invention of certain improvements in lamps.* [Sealed 4th July, 1827.]

The subject of this patent is a table lamp on the pneumatic principle, that is a lamp, in which the oil is forced up a column to the wick or burner by the pressure of condensed air, confined in a close chamber at the lower part of the stand.

The lamp is intended to be constructed in the form of

an architectural column with a large base, in the lower part of which the oil is placed, and the vessel being very strong, and perfectly sound at its joints, a quantity of air is forced into it by means of a small piston, which is an air pump, and the elastic force of this air, when condensed by the pump acting upon the surface of the oil below, forces it up the central column to the wick or burner.

Thus far the principles on which this lamp is constructed, are precisely the same as Michell's patent Barrington lamp, see Vol. II. page 354, of the First Series of this Journal, and Vol.II. page 321, of our Second Series; but the feature of novelty proposed by the present patentee, is a tube which he calls a *capillary tube*, intervening between the reservoir of oil and the burner, for the purpose of conveying the oil up to the burner, without allowing it to be directly forced so high by the pressure of the condensed air, which would, without the intervention of this capillary tube, be very subject to flow over, and even to jet out at the top in a fountain.

This capillary tube being long, and of small diameter, prevents the oil from flowing too freely up to the burner; and in case any more oil should rise than is consumed by the burning wick, there is a provision for its falling over and descending again through a pipe into the reservoir.

The piston of the air pump is to be furnished at top with a thumb-piece, sufficiently large to work it until the air vessel is full; but the leverage being very small, the thumb will not be enabled to continue working the piston after the vessel is properly charged with air. A helical spring is placed round the conical end of the piston, for the purpose of throwing it up, after it has received its down stroke by the pressure of the thumb. The external form of the lamp may be any that taste may dictate, provided

it is capable of containing the apparatus within for effecting the objects desired.—[*Inrolled in the Inrolment Office, January* 1828.]

To THOMAS PEEK. *of St. John Street, in the parish of St. James, Clerkenwell, in the county of Middlesex, engineer, for his invention of the construction of a new engine, worked by steam, which he denominates a revolving steam engine.*—[Sealed 1st Aug. 1827.]

THIS steam engine, though called a revolving engine, is really upon the reciprocating principle, and scarcely in any one minute particular differing from those of the ordinary constructions, excepting in the strange anomaly of putting the cylinder, with its piston and rods, in rapid rotation round a fixed toothed wheel, instead of actuating the wheel by a piston working in a fixed cylinder, as is the common mode.

Upon a substantial horizontal frame work of iron, a hollow axle, carrying a pair of fly wheels is mounted, in the centre, between which pair of wheels the working cylinder of a steam engine is placed, and made fast by screws, and bolts, to both the wheels in the direction of their diameters; the cylinder being so nearly balanced as to allow it and the connected fly wheels to turn freely round with the hollow axle.

Through the cap of the working cylinder and the stuffing box the piston rod extends, and is at its outer extremity connected through the medium of radius rods and sweep rods to crank pins, or excentric pivots, on the faces of two toothed wheels, mounted on pivots, fixed in the opposite arms of one of the fly wheels. The reciprocating action of the piston in the working cylinder by means of these connecting rods, gives rotatory motion to the toothed wheels, and the teeth of these wheels taking into a stationary wheel or circular rim of teeth, fixed to

the standards or frame-work, causes them to run round the toothed rim, and to carry the cylinder with the fly wheels and hollow axle round with sufficient power, as a first mover, to drive any other machinery.

The steam intended to actuate the piston in the cylinder is to be of the high pressure kind, and to pass by a pipe from the boiler through one of the hollow axles to the valve-box, where the slide for effecting the induction and eduction is to be worked by a rod and tappets, or an excentric, or any other suitable contrivance connected to the rotatory part of the engine, and the eduction steam is to pass off by the hollow axle on the opposite side.

The contrivance is said to be applicable to various constructions of steam engines, and is to be considered new only as respects the mode of driving the cylinder, fly wheels, and axle round, by directing the reciprocating power of the piston through the agency of connecting rods, to give rotatory motion to spur wheels, which take into a fixed circular rack, and thus cause the rotatory motion of the principal parts of the engine.—[*Inrolled in the Insolvent Office, Febrnary*, 1828.]

To THOMAS SOWERBY, *of Change Alley, Cornhill, in the city of London, Merchant, for his invention of certain improvements in the construction of Ship's windlasses.* —[Sealed 4th July, 1827.]

THE object of the Patentee is to prevent the recoil of a windlass, when in the act of raising the anchor, and to hold it securely when raised, which, in the ordinary construction of windlass is effected by palls dropping into a ratchet wheel placed at the end of the windlass upon the same axle.

As these palls are but slight, and are apt to break by a sudden recoil, or may happen to be raised out of the ratchet at the time when they are required to take effect, it is proposed to adapt a segment piece with teeth, which shall at all times

be in gear with the ratchet-wheel, and thereby prevent any accident which a sudden recoil of the windlass might otherwise produce.

Plate IX. fig. 9, represents a windlass in traverse section ; *a*, is the wooden barrel, and *b*, the ratchet-wheel, or rim of teeth, which barrel is supposed to be mounted in suitable standards, and enabled to revolve upon its axis ; *c*, is the segment pall piece with teeth, suited to fit exactly into the teeth of the ratchet-wheel. This segment piece is allowed to slide up and down upon its iron bearing, and is kept in its situation by a pin passed through a slot.

When the windlass is turned round in the direction of the arrow, as in drawing up the anchor, the segment pall piece *c*, rises sufficiently to permit the ratchet teeth of the wheel to pass those of the segment; but, if by a recoil, the windlass should attempt to turn the reverse way, the teeth of the segment pall piece instantly take hold of the ratchet-wheel, and lock the windlass firmly.

It is obvious, that when it is desired to let the cable and anchor run out, it is only necessary to raise the segment pall piece *c*, and the windlass becomes free to run round.

In order to give additional security to the locking, when the anchor is raised and suspended by its cable, another segment pall piece *d*, is placed below, which rises and falls in the same way as that above described ; and, in order to bring the teeth of this segment pall piece or chock *d*, into gear with the rachet-wheel, the wedge *e*, must be slidden forward horizontally, which raises the chock *d*, and keeps it firmly locked to the ratchet-wheel of the windlass.

It must be obvious, that this is a much more secure mode of holding the windlass than by the ordinary palls, and from its great simplicity, there is no doubt but that it will be very generally adopted on shipboard.—[*Inrolled in the Inrolment Office, September*, 1827.

To Joseph Maudsley, *of Lambeth, in the county of Surrey, Engineer, for his invention of certain improvements on steam engines.*—[Sealed 1st August 1827.]

A very short specification describes the subjects of this patent. They are divided into six different heads: 1st. An improvement in the general arrangement of all the parts of a steam engine, the individual parts not being new in themselves. 2d. Constructing the frame-work or standards, which are to support the engine, in the form of a triangular prism. 3d. The adaptation of a D, valve for the induction and eduction of the steam. 4th. The employment of excentrics on the rotary parts of the engine to work this D valve. 5th. Conveying the steam from the gudgeon to the working cylinder; and 6th. The formation of the slide case.

To the specification is appended a large drawing, representing a steam engine with a swinging or vibrating cylinder, and the reference to the drawing, states, in the most superficial and general way, that A, is the frame work, B, the cylinder, and so on; but as to any particular explanation of the invention, as described above under the six several heads, not a word is said upon the subject, except the enumeration of parts above recited, and we are left to conjecture what are the particular points intended to be claimed: which the reader will be as able to determine as ourselves.—[*Inrolled in the Inrolment Office, December,* 1827.]

To Edward Dodd, *of Berwick Street, Soho, in the county of Middlesex, musical instrument maker, for his invention of certain improvements on piano-fortes.* [Sealed 26th July, 1827.]

It may be thought a very extraordinary description of this invention to say it is something about placing the sound board of a piano-forte upon ribs, leaving hollow spaces under it, and extending the dimensions of the sound board an inch or two at the base part: yet, such is the vague and defective explanation which the specification gives of this invention, that we really are unable to afford a more lucid explanation of its construction, or to give our readers any further clue to the object intended by the patentee, or to the claim of invention or novelty which he may consider himself to be the author of.

A representation is given of the kind of hammer which is employed to strike the strings; the form is the same as usual; but the outer piece of leather, which wraps round the point of the hammer, is to be glued at one end to the wood, and at the other end made fast by a small clamp piece and screw. The object of this is not expressed, but we presume that the outer piece of leather, being connected to the end of the hammer in this way, instead of attaching it by glue, will cause the blow given by the hammer upon the string to be softer, and produce a less wirey tone than the old construction of hammer, and also admit of the leather being tightened up, if it should become loose by wear.—[*Inrolled in the Inrolment Office, January*, 1828.]

ON THE EMPLOYMENT OF MACHINERY.

The expediency of employing machinery in our manufactures has been, for years past, a subject of much diversity of opinion, and from the popular feeling at the present moment, it would appear, that its advocates are considerably in the minority. It is even a question with those, who appreciate the advantages of machinery, whether its employment ought not to be limited. For our own part we consider this subject as one of the first importance—in a national point of view, and embracing a very widely extended range of consequences.

It is not alone sufficient to argue, that machinery diminishes—the quantity of manual labour, which would otherwise be requisite for to conduct our manufactures, it must also be taken into the account, that by means of machinery, we are enabled not only to increase greatly the quantity of articles produced, but also to make them at a much lower price than could be effected solely by manuel labour; the consequence of which, is a greatly extended demand for those articles, among that class of he community, where formerly such things were scarcely known, and certainly not used.

This it will be said, is arguing at large, without any definite point, upon which the *pro* and *con* may be stated, and the question, as respects that particular point, settled beyond dispute. Let us then take one subject, the manufacture of woollen cloths; perhaps, the very first art that was ever practised by mankind, and which we may fairly presume to have originated when man was in a state of primeval ignorance or semi-barbarism: at a time when the human intellect had scarcely expanded so far, as to *conceive* those things, which have subsequently formed the most essential comforts, indeed the indispensible necessa-

ries of life ; may we not consider clothing of wool one of them ?

In the infancy of the social world, when the rocky cavern or the umbrage of a closely mantled wood, constituted the only shelter, by which man could protect himself from the rude elements, next to procuring food for his daily sustenance, he naturally sought some artificial means of providing clothing, to cover and keep warm his naked body; and finding that nature had bountifully furnished all other animals but himself with furry skins, or feathers, his ready course appeared to be, depriving those animals of life, and appropriating their skins for his own covering: forgetting that he, the lord of all aminals, alone had REASON, which should have led him to effect that by ART, which had wisely been withheld by nature.

Necessity, however, soon brought this truth to man's conviction, that he must "live by the sweat of his brow," and as his species began to multiply, sufficient clothing could no longer be obtained for all, from the precarious chances of the chace. Then arose the idea of constructing artificial skins or coverings: and here, the first efforts of art were displayed, in combining such superfluous tufts of hair, wool, and feathers, as might have fallen upon the ground, or have been caught in the bushes and brambles: which when interwoven like a bird's nest, or stuck together by any adhesive matter, would, though imperfectly, supply the clothing sought; indeed of such kind of manufacture are the habiliment of savage nations, at this very day.

Of all the coverings of animals, the shorn fleece of the sheep afforded the greatest facility of adaptation as a clothing for mankind. Even accident pointed out that wool, when pressed with moisture, would become matted or felted together, and constitute a substance capable of clothing and keeping warm the human frame; but this

needed no effort of the mind. Some early genius having twisted rushes together, and made cords, invented the platting of them into wicker work, for the constructing of huts, or the first artificial erections for the residences of our primitive ancesters. This was an effort of art; but it was a greater genius that first devised the art of interweaving cords, made of twisted wool, into a broad sheet, to constitute a covering for tents, or a garment for the human species—perhaps a Belus, a Hermes, an Osiris, or some other of those illustrious names of antiquity, which grateful man has ignorantly deified, in commemoration of his usefulness in his generation when upon earth: and shall we in our enlightened age neglect, condemn, despise that genius and art, which shines around us, and of which we ought to be as ambitious as all neighbouring nations are envious. Let the self approving, sapient, political economist point out to us where we may stop in a retrograde march of the arts?

If we were to trace the progress of invention, which has through a series of ages brought the art of manufacturing woollen cloth to that state of facility and excellencein which we now find it, the subject would expand itself to a volume; we shall therefore merely point out some of the striking consequences of employing machinery in that art, within the last half century.

It is an unquestionable fact, that almost all marks of society in our own country, a few centuries back, had their clothing principally of leather; some of the superior orders wearing linen for their under garments, but very little woollen cloth, even of a coarse quality was then used, and that was not manufactured here, but imported from a foreign country.

Before the time that Sir Richard Arkwright introduced his machinery for preparing and spinning cotton, which was toward the end of the last century, the spinning and

preparing of wool was performed by the fingers of peasants, unassisted by any mechanical apparatus, but the old spinning wheel, and a few hand tools for opening, separating, and cleaning the wool; those important inventions naturally led to the appropriation of similar machinery for the woollen manufacture, and the consequence is, that instead of a few peasants occasionally engaged in the tedious operation of spinning wool by hand, we have now, at a fair computation, very little less than a million of persons in this country, deriving their sole subsistence from the art of spinning and preparing wool by machinery: and from the consequent cheapness of the goods produced, there is not a person, of whatever condition in life, from the highest to the lowest, but is now clothed in woollen garbs of some kind, as their price bringing them within the reach of every one.

Such is the consequence of our extensive employment of machinery; indeed, it is questionable, whether the united efforts of the entire population of this island could produce by hand labour, unassisted by machinery, as of old, a sufficient quantity of woollen goods to supply our home consumption, and exportation, as the demand now stands in the British market.

We are almost exclusively indebted to our mechanical inventions for the vast commercial intercourse we have for years carried on with foreign nations. Who is there that knows not, our trade at one time consisted solely in exporting raw tin, and sheep's wool. Is it not now acknowleged, that every useful article for the wants and convenience of mankind, is made amongst us, and both cheaper and superior in quality to any other country to what are we then to attribute this superiority? why, entirely to the excellence of our mechanical works, and the facility afforded by machinery.

This subject naturally expands itself into a wide field

of facts, circumstances and arguments; as much might be said of many other arts as of the woollen manufactures, and the same reasonings would be found to bear in support of machinery. Indeed, there are innumerable instances, if we take but the trouble of looking round us, in which machinery has produced new articles of very general demand, and created wants which could be supplied by no other means.

We should have pursued thisargument in connectionwith several other branches of the arts, but it would have been for the most part a repetition of cases coinciding with what has been already said, we therefore close our remarks for the present, by copying part of a small, well-written pamphlet, which has just issued from the Society for Diffusing Useful Knowledge, in which many very correct and valuable remarks are made upon machinery and its effects, as an address to the working classes.

"You appear to have contracted a great dislike to the use of what are termed machines, and chiefly to the use of thrashing machines. You have never well considered the reason of your dislike. You merely state, that machines are hurtful to labourers; that they prevent the poor being employed. Upon these grounds, you proceed to destroy them.

"The word MACHINE seems to convey to your minds some contrivance necessarily attended with mischief to the poor; whereas, in truth, the word machine means the same as tool or instrument, on all occasions has the same signification. A thrashing machine is a tool or instrument with which we thrash; so is a flail, only that it is a far less useful machine.

"You must remember, that the Almighty has sent man into the world furnished, as far as the make of his body is concerned, with less means of providing sustenance for himself, than any other animal it has pleased Him to create. All other animals early, indeed, soon after their birth, provide for themselves; the care of the parent ceases, and each individual amongst them depends on his natural powers for support.

"But this bodily weakness of man is amply and fully made up to him, and the defect supplied by the reason, intelligence and invention, which God has bestowed on him.

"Man, when thrown into the world in this state of weakness, begins, as soon as he feels his wants and the necessity of finding food, to look about for tools, instruments or machines, to assist him in cultivating the soil, the common mother of all his comforts. He first invents the most simple tools; the hoe, the spade, the rake, the axe, the flail, the last of which is a machine, which requires much experience to use with effect; but before he can obtain these machines or tools in the perfection in which we now use them, he must have discovered iron, the art of melting it, of casting it, and, when so cast, reducing it again into hard, soft, or brittle metal, according to the uses for which he destines it.

"As men by experience and practice extend their knowledge further, they contrive other machines, instruments or tools; they make the wheel, the cart, the plough; all of which are intended and used to ease his toil and abridge his labour. If these instruments did not produce this effect, men would reject them as useless and unprofitable.

"Further experience and practice lead to further contrivances, but they are always made with the same object in view, that of decreasing our bodily toil and increasing our comforts. Men have invented the complicated machinery of mills, thrashing machines, and steam engines; and these are used because they tend to increase not only the comforts of him who uses them, but of him who purchases the articles and necessaries of life which these machines prepare for market, and consequently for the whole community. Whatever tool, instrument, or machine lessens the quantity of labour required to prepare any commodity or article, renders it cheaper in the market, and more within the reach of every person who desires to buy it; and, of course, as labourers are buyers, they profit by the cheapness. This is proved by the following plain and simple reasoning.

"The price which must be paid for any article which is bought, is always equal at least to the cost or price of the labour bestowed upon it. The labourer must be paid for his work, and this payment to him makes a part of the

price asked for the article to be sold. An article which requires the labour of two men to make it, must cost twice as much as one which requires the labour of a single man only; but if a person, by the invention of some machine, tool, or instrument, can make, with the assistance of such machine, an article, which before the invention took the labour of two men, he can afford to sell it for the price of the labour of one man, and a part of the price the machine so invented cost him; and as these tools often last a long time, a small portion of that price is sufficient. Now these plain truths apply equally to the most simple and the most complicated machines or tools.

"Take the example of a carpenter. By the assistance of his saw, his axe, his planes, his chisels, of the best sort and construction, he will do as much work as two men can do with worse tools, and ten times as much as ten men could without any machine or tools whatever. When Peter the Great was endeavouring to civilize his Russian subjects, he found that they had no other way of splitting their trees into deals, except by the axe, which wasted their labour and their timber, and made very clumsy planks. He introduced the saw, by laying a tax upon deals cut with the axe; and though the first year brought a large revenue from the impost, the next year it fetched little or nothing, all men using the saw, which they found an immense saving of both work and wood; and the poor Russians, though very uncivilized and ignorant, had the sense to see that all the people gained by the change, because all got their deals cheaper and better; therefore they never dreamt of complaining that the saw threw hands out of employment. Now, suppose a labourer should go to a carpenter working with machines or tools of the best construction, and say to him, 'These tools prevent the labourer being employed, and you shall use worse tools, and take another hand to help you;' would not the carpenter answer to the labourer, 'you are a madman! I can sell you the articles you want cheaper, and I make them cheaper than if they required two men to make them. It is not the interest of you or of any individual to destroy my tools; and if you attempt it, and I can resist your attempt by force, I will do it; if I cannot, and am obliged to yield to your lawless and cruel endeavour to injure me and yourself, I will seek my remedy against you at the hands of justice.'

"Now remember, labourers, there is no difference between the case of the labourer who breaks the thrashing machine of the farmer, and that of the labourer who destroys the tools or machines of the carpenter. The injustice is equal in both cases, although the consequences are more striking in the case of the farmer, from the greater value of machines destroyed, and the greater injury sustained by the numerous individuals who depend upon the farmer for a supply of corn. When the farmer has cut his corn and housed it, the grain must be separated from the chaff and straw; you would not, surely, desire to rub it without your hands, though certainly that would take more labourers. Some machine or instrument must be used to thrash it out. Why should not the farmer be permitted to use the instrument which will do this work most readily and effectually—which will do it at the least cost, and enable him to send the corn to market, to be sold at the lowest price?

"Your clothes, your stockings, your shirts, are all made by machines, far more curiously contrived than the thrashing machine. The calico which makes your shirts, is woven by a machine, attended only by a girl; but in consequence of the little labour required to manage it, the shirt which formerly cost seven shillings, now costs only eighteen pence.

"It is undoubtedly true, that all machinery which spares human labour, unavoidably, on its first invention and on beginning of its work, throws some persons out of the employment in which they had been engaged, and they must seek their means of support in some other way; this is the necessary consequence of the introduction into use of the most simple instrument, and of all improvements in art. But on the whole, the public, and every individual in it, are in the end infinitely the gainers. In following the course you are now pursuing, you are driving men back to their savage state, when they lived upon acorns and roots, and had no machines nor tools at all, a great demand for labour, and very little to eat.

"The object of this address is to point out to you, that the breaking of machinery will not remedy the evils of which you complain. You will soon deeply repent of your projects and your acts. You will find that corn will rise in price, in proportion to the increase of labour bestowed in bringing it to market.

"The outrages you have committed are equally dis-

graceful and injurious to yourselves, and must, in combination with the still more horrible crime of burning—spread famine and desolation through the land. Your sufferings cannot be relieved by such acts; you will heap on your own heads, on your children, your families, and the rest of your fellow creatures, evils which when they arrive will terrify the stoutest hearts, and fill with repentance and remorse the boldest of your leaders.

"It is true that the number of labourers exceed the means which can be found for their employment; and in this excess lies the real cause of the present distress amongst you. It has been brought on by a train of circumstances, for which the present generation are not answerable. But the remedy will not be found in employing two men to do that which can be done, and better done, by one. The best relief will be found in the fervent and anxious desire, which is now felt by landlords and their tenants, to make every sacrifice in their power to support and comfort those, for whom constant employ cannot be obtained, and to pay those who are fully employed, a sum amply sufficient to purchase the necessaries and comforts of life. An increase of trade, commerce, manufactures as the country prospers, will cause an increase in the growth of corn, to supply the food of those who labour in manufactories; fresh mouths to feed will require more food for their use, and take up the labourers who are now unemployed in the fields.

"One other remark shall close these observations; and it is addressed to the whole community as well as the labourers, but it interests the labourers most of all. The use of thrashing machines saves exactly one-tenth part of the grain. One-tenth part is five weeks' consumption of the kingdom, and makes all the difference between a good and a bad harvest—between a dear and a cheap year. Whoever breaks these machines, therefore, does as much harm to the country as if he made a dearth in it.

"A few years ago, when there was a full demand for labour, thrashing was considered as the most irksome kind of labour. It may now be said in defence, even of the much abused thrashing machines, that the farmer can employ the whole number of his labourers under shelter on wet days; whereas when he thrashes by the flail, two or three men are constantly at work under shelter even in dry weather, and there is no room to admit more, no comfortable work for the whole number in bad weather."

AMERICAN PATENTS.

For an improvement in Horse Shoes; Sumner King, Sullivan, Madison county, New York.

The improvement designated is the making the caulks, or projections, moveable, instead of permanent; for this purpose the shoe is to be formed with an opening or mortise in the toe to admit the moveable caulk to slide in, when it is to be secured by a bolt, or screw and nut. "The hinder caulks may be fastened on in the same way, or they may be permanent."

"The caulks can be cast, or made of steel or iron, or any other metal."

"What I claim as my invention, is, the making of moveable caulks, or projections, for horse shoes, whether made of cast or wrought iron, or of any other metal as above described."

For a tool called a Screw Swedge, for Cutting or Forming the Screw Thread in Brass, Iron, Steel, or other Metal; Richard Whitney, Baltimore, Maryland.

This patent is taken for the forming of screws on "common screw-bolts, wood screws, and all other purposes for which it is necessary that the screw thread be cut thereon; and an easy method of forging the nuts to be used with said screws after they are thus formed, or made in the old way, with a plate; the aforesaid tool answering all the purposes of common screw plates now in use."

The tools for which this patent is taken are very clearly described, and distinctly represented. There must be a pair of swedges made, one of which may fit into the eye of the anvil, as usual; the upper swedge should have a proper handle and a guide to insure its standing correctly over the lower. In each of these swedges one-half the intended screw is to be sunk just as they are in the dies in screw stocks. The heated metal is to be placed between

these, and the screw formed in them by forging. The thread may be angular, or square, as may be desired.

For some purposes this contrivance will undoubtedly answer, but it must be for very common purposes. The stretching, or lengthening of the screw, produced by the common stocks, and especially by the screw plate, which is so injurious to those screws which are intended to work in deep nuts, will be produced in a much greater degree by the proposed plan, excepting in those instances where the length of the screw is not greater than that in the die.

To talk of forging screws of brass in such tools may do for one who has never essayed the working in that metal; we are assured that no worker of brass will violate this part of the patent. We know that screws might be so cut upon small, cold, brass wire, but we also know that it would be very far from an improvement.

The method prescribed for forging the nuts, is to make them in the usual way, punching the hole sufficiently large to pass over the tap, then to heat them, and forge them on the tap, by striking carefully on their square edges, so as to bring up the thread. Such nuts, if they are to be neatly finished, will require more labour in filing their sides than would have been necessary to cut a good screw with a tap.

For an improvement in the Mode of applying the Common Flyer for Spinning and Twisting, denominated the "Universal Spinner."—John Brown, Providence, Rhode Island.

The spindle in the improved mode proposed, has a bearing at each end, and an aperture at top, for the thread to pass through, similar to that in the common flax wheel spindle. The bobbin has a positive motion given by a whirl at its bottom; the flyer is attached to the upper part of the spindle, and this latter passes through a tube made fast in the waive rail, or lifter, on the throstle frame; it runs quite freely in this tube, being subjected as little as possible to any obstruction, excepting that of the draught of the thread, which is attached to the flyer in the usual way. To regulate the draught with the necessary precision, the lower end of the spindle passes through a notch in a piece of leather, to which a weight may be attached.

"The band which gives motion passes from the cylinder in the frame, to a whirl under the bobbin, on said tube, instead of passing to a whirl on the spindle; neither the whirl nor the bobbin having any connexion with the spindle, excepting in causing the revolution of the flyer and spindle, by the aid of the thread; the flyer being fast is conveniently lifted from its place, with the spindle, for doffing, &c."

There is a fast whirl on the tube, on to which the band may be dropped, and from which it may be raised, by a touch of the finger, when piecing is to be effected.

The claim is to the "peculiar application of the flyer and bobbin, as above."

For an improvement in the Spindles used in Spinning, and in the Throstle Frame. Benjamin Brundred, Oldham, Bergen county, New Jersey.

Three different modes of constructing spindles are described, and claimed as new; the description is very clearly given, by the aid of a well executed drawing. They are all fixed, or still spindles. In the first, a brass tube is fitted upon the spindle, extending down to the bobbin lifter, and upwards about two-thirds of the length of the spindle. On the lower part of this tube is a whirl by which it is turned, and on the upper part the bobbin is fitted. The upper end of the spindle is hollow, being drilled down to the depth of two or three inches; a small spindle fits and turns in this drilled hole, having flyers attached to its upper end. The operation of this spindle need not be described to those who are familiar with such machinery. The two others are different modifications of this spindle which are ingenious, but more complex than the former.

The improvement in the throstle frame consists in extending arched pieces from the extreme supports of the frame, to sustain it on the floor, instead of the many legs upon which it usually stands, subjecting the machine to derangement from the sinking of the floor in any part,

The claims are to the various modes of constructing the spindles, and to the arched supports of the throstle frame.

For an improvement in the Manufacture of Pasteboard, Band-box Paper, Bookbinders' Boards, and all other kinds of brown paper. Isaac Sanderson, Milton, Norfolk county, Massachusetts.

This patent is taken for manufacturing the above named articles from salt meadow grass, of various kinds, first made into hay, and prepared by using lime water, potash, and train or spermaceti oil. The patentee does not, however, claim either the use, or the mode of using the foregoing articles, and says, "but what is claimed as a new invention, or discovery, by me, is the making of brown paper entirely, or chiefly, from salt hay boiled and prepared as aforesaid."

For an improvement in the Bedstead as inclosed within, or attached to Presses, Bureaus, Sofas, &c. denominated the "Secret Bedstead." Williams Wooley, City of New York.

The bedstead above named is made to fold up in a manner which resembles the leaves of a common dining table, supposing the table inverted. The sacking bottom is fastened to two strips which drop into notches, or mortises, in the frame. The bottom part of the bedstead is upon castors, or rollers, upon which it is run out of the press when the doors are opened. Two levers, one at each end of the press, connect the bedstead and press together, one end being attached to the press, and the other to the bedstead, by pins, so as to form a joint.

The specification does not state in what the improvement consists, but merely describes the whole bedstead, without any claim: if the patent can be sustained, therefore, it must be limited to the particular arrangement of the parts as specified.

For machinery for bending waggon-wheel and other tires. Lester Butler and Isaac Hinkley, Cobleskill, Schoharie County, New York.

The whole of the specification is comprised in the following words:

"Instead of having the bed and notch pieces, on which the under rollers run, stationary, and the rollers varied by

moving them on said notches, which are an inch or more apart, as those in use are, the under rollers are regulated by placing them on slides, with one notch on each slide, which are moved by means of a screw on each end of the bench or platform, on which the slides and rollers are placed. By this method, the under rollers may be varied so as to bend to any diameter you please."

The drawing affords little or no aid in explaining the machine; the general nature of the improvement, it is true, may be collected from the above brief description.

For an improved mode of taking the Figures of Ingrain Carpets from the Cloth. William Sherwood, Somersworth, Strafford county, New Hampshire.

This improvement will best appear by comparing it with the old methods. First. Figures have been taken from the cloth by the tedious operation of counting the threads. Second. They have been taken by copying the figure upon design paper, and then placing the paper against a reed, the splits of which correspond with the design, a simple having been previously drawn through each split. The figure is then picked up by the simples, where the paper is painted. In my improvement no reed is used, but a loop is made in the end of each simple, and the cloth being wound upon a roller, or beam, the filling is taken out of the centre of the figure. The changes of warp which make the ground of the carpet, are drawn through the loops, and wound upon another beam, which brings the cloth in a horizontal position, and the threads of warp which make the figure are cut off close to the cloth. A wire is then run into the place of the centre thread of filling, which makes the figure, and when shoved back against the simples it separates the two parts required. The centre lash, or change of the filling, is then drawn out, and the next lash is taken in the same way, and so on, until the figure is completed.

Instead of drawing the threads of warp, which make the ground, through the simples, as above described, those threads which make the figure may be taken for

that purpose; in which case the changes must be made by the filling of which the ground is composed, or a wire put in its place.

What I claim as my specific invention, is the connecting the threads to the simple.

For an improvement in the Bee Hive; Ebenezer Beard, Charlestown, Middlesex county, Massachusetts.

The hive recommended is a double, square hive, one compartment being placed upon the other, with a division between them. In the upper division there may be four different compartments, formed by four separate boxes, which are placed with their mouths downwards. The communication between the upper and lower compartments may be opened or closed by means of slides; they are left open until the bees have filled a box with honey, when the slide is closed, and the bees within the box confined there; after " a few hours the bees in the box will become tame and harmless, in consequence of being shut out from their queen. The box may be then removed by lifting it out of the chamber, and setting it by, inverted; the bees will return to the hive, the box may then be emptied and replaced, the slide drawn out, and the work proceed as at first.

For an improvement in the manufacture of Hats, consisting in the stiffening thereof; Samuel W. Williams, Elizabethtown, Essex county, New York.

The process employed is similar to that now extensively used, in which shellac is dissolved in an alkali, applied to the hat in this state, and the alkali neutralized by the sulphuric acid. In the present instance, however, copal and resin are added in certain proportions, and it is said that this plan is more economical than that generally followed. The claim is to the adding these two resins; the mode of combining them; the relative proportions in which they are used; and to the mode of applying the stiffening.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[British Law of Patents for Inventions.]

MERCHANT Strangers (being no enemies) coming into this realm, shall be well used. All merchants (if they were not openly prohibited before) shall have their safe and sure conduct, to depart out of England, to come into England, to tarry in, and go through England, as well by land as water, to buy and sell, without any evil tolts; except in time of war.—Magna Charter, 1225. 9 H. III. s. 1. c. 30. confirmed by 1382. 5 Ric. II. stat. 2. c. 1.

All staples shall cease, and all merchants may come in, and go out, with their merchandize, without any disturbance.—The staples beyond the sea and on this side, ordained by kings in times past, and the pains thereupon provided, shall cease. All merchants, strangers and privy, may go and come with their merchandizes out of and into England, after the tenor of the Great Charter.—1328. 2 Edw. III. c. 9.

Merchant strangers may buy and sell within this realm, without any disturbance. All merchants, strangers, and denizens, and all others, of whatsoever estate or condition, that will buy or sell corn, wines, aver de pois, victuals, wares, and all other things vendible, from whencesoever they come, by foreigners or denizens, at whatever place it be, may freely sell, to whoever they please, foreigners or denizens; except the King's enemies. Notwithstanding any charters, usages and customs to the contrary, for the same are to be held of no force, but as things granted to the damage of the King, and the great men of his realm, and to the oppression of the commons; saved always to

the King the customs due on the merchandize.—1335. 9 Edw. III. s. 1. c. 1. enforced by 1350. 25 Edw. III. stat. 4. c. 2. also confirmed by 1353. 27 Edw. III. stat. 2. c. 2.

All merchants (being no enemies) shall come into the realm, and depart quietly. The provisions of the Great Charter are confirmed; saving reasonable customs and subsidies to the king, and free customs granted to the City of London, and to other cities and towns.—1340. 14 Edw. III. s. 2. c. 2.

Fiftieth Edward the Third. John Peachie, of London, was severely punished for procuring an exclusive license under the Great Seal, that he only might sell sweet wines in London. Coke's Institutes, part 3, chap. 85, against Monopolists.—1376. Rot. Par. nu. 33.

No lands shall be granted by Letters Patents, until the King's title be found by inquisition, duly made according to 8 Hen. VI. c. 16, and 36 Edw. III. c. 13.—1439. 18 Henry VI. c. 6.

Confirmation of Letters Patent, made by Edw. IV. to several persons, of offices.—1461. 1 Edw. IV. c. 1.

An Act for Grants, made by King Edw. IV. since the first year of his reign, *exp.*—1467. 7 Edw. IV. c. 4.

A Patent was granted by King Henry the Seventh, to John Cabot, a Venetian, to go upon discovery of new lands in America, under English colours. In 1502, another such patent to John Gonzales. Also, in 1506, a patent to an Italian, for making Alum, a new art which had been recently established in Italy.—1496.

An Act annulling second Letters Patents of Grants during the King's pleasure, making no mention of the first Letters Patents for the same things. Any person making suit to the King, for grant of any lands, offices, or other things before granted to any other during pleasure, (the first patentee being in life) shall express in his petition or patent, the tenor of the former patent, and in what manner the King hath determined his pleasure against the said first patentee; or else the second letters patent shall be void.—1514. 6 Hen. VIII. c. 15.

An Act for making cables at Burport, in Dorsetshire, but not within five miles thereof. Also, in 1533, 25 Hen. VIII. c. 18, for making woollen cloth at Worcester city, exclusively of the adjacent country.—1529. 12 Hen. VIII. c. 12.

An Act concerning clerks of the signet and privy seal, and the offices and fees connected with, and incident to, royal grants by letters patent, or closed.—1535. 27 Hen. VIII c. 11.

(*a*) Every grant made to any person by the king, in writing with his sign manual, before being passed under any of his

Grace's great seals, shall be first delivered to the King's principal secretary, or to one of the King's clerks of the signet. (*b*) The latter shall, within eight days after receiving such bill, so signed with the king's hand, make out and sign letters of warrant in the king's name, and sealed with the king's signet, to the lord keeper of the king's privy seal; and after due examination of such warrant by the said lord, one of the king's clerks of the privy seal, shall, within eight days after receipt of that warrant, make out and sign other letters of like warranty to the Lord Chancellor, or other keeper of the king's great seals, for the writing, and sealing with such seals as remain in their custody, of letters patent, or closed, according to the tenor of the warrant to them directed as aforesaid, from the officer of the privy seal.* (c) Any person writing warrants or procuring grants under any of the great seals, after any other fashion than as before specified, shall forfeit 10*l*. for every bill passed contrary to the order hereinbefore prescribed: one half of the penalty to the king, and the other half to him who shall first sue for the same.

(*c*) The fees payable, and the mode of receiving, and accounting for them, is also regulated.

(*d*) The Lord Chancellor may, at his discretion, pass any thing by the great seal, and deliver the same, without paying any fees at the great seal, signet and privy seal.

In the 30th of Henry VIII. The manner of casting pipes of lead, for conveyance of water under ground, was first invented by Bobert Brock. He was one of the King's Chaplains. Robert Cooper, goldsmith, made the instruments and put the invention first in practice.—1538.

In the 35th of Henry VIII. The first cast-iron pieces of Ordnance that were ever made in England, were cast at Backstead in Sussex, by Ralph Page and Peter Baude. The art of casting cannon in brass had only been recently established in England, about 1535. Cannon had been first used by the English by Edward III. at the battle of Cressy in 1346; and in 1383 by the Governor of Calais, but were not used in England till the siege of Berwick in 1505, and after that they became common.—1543.

An Act for the confirmation of Letters Patent, notwithstanding the misnaming of any name, place or date contained in the same, *exp*. See also 7th Edward VI. c. 3, and 35th Eliz. c. 3,

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* Note.—The proper date for such letters patent or closed, is not fixed, but is provided by 18 Hen. VI. c. 1.

(chiefly on grants of Church lands.)—1542, 34 and 35 Hen. VIII. c. 21.

A Bill for confining the making of Coverlets in Yorkshire to York City.—1542. 34 and 35 Hen. VIII. c. 10.

An Act for the confirmation of Letters Patent, notwithstanding mis-recitals, or lack of inquisitions, or of certainty in valuing, *exp*. *Note*. This Act appears to avoid the previous provisions of 1st Hen. IV. c. 8, and 18th Hen. VI. c. 6.—1547. 1 Edw. VI. c. 8. *exp*.

An Act concerning Grants and Gifts made by Patentees out of their Letters Patent. The enrolment of patents is to be received in evidence, by showing an exemplification or constat of the roll, under the great seal, which shall be as good as showing the first patent itself.—1549. 3 and 4 Edw. VI. c. 4. extended by 13 Eliz. c. 6.

An Act for confining the making of Felt Hats in Norfolk to Norwich and Pulham.—1552. 5 and 6 Edw. VI. c. 24.

An Act for the confirmation of Letters Patent of Bargains and Sales, by Hen. VIII. and Edw. VI. notwithstanding mis-recitals of the particulars, *exp*.—1553. 7 Edw. VI. c. 3.

An Act for the confirmation of Letters Patent made by the King and Queen, *exp*.—1557. 4 and 5 Phil. and Mar. c. I.—*Note*. A Patent was granted in the reign of Philip and Mary to the Corporation of Southampton, for the exclusive importation of Malmsey wine at that place. This was set aside in the 2d and 3d Eliz. by all the Judges, as being contrary to statutes (viz. Magna Charta; 9th Edw. III.; also 14th, 25th, 27th and 28th Edw. III.; 2d Ric. II. c. 1, and others,) and against the freedom of trade.—Coke's Institutes, part 3, c. 85.

An Act that the exemplifications, or constat of Letters Patent, shall be as good and available in Law as the Letters Patent themselves. A supply of the 3d and 4th of Edw. VI. c. 4; and is extended to all patents since Hen. VIII.—1570. 13 Eliz. c. 6.

Bircot's case, decided at law in the Exchequer Chamber, 15th Elizabeth, Easter Term. A privilege concerning the preparing and melting, &c. of lead ore.—1572.

"A privilege, to be consonant to law, must be for what is substantially and essentially newly invented; if the substance was in being before, and a new addition made thereunto, though that addition make the former more profitable, yet it is not a new manufacture in law. It was there said, that that was to put but a new button to an old coat, and it is much easier to add than to invent; it was also there resolved, that

if the new manufacture be substantially invented according to law, yet no old manufacture, in use before, can be prohibited." This case was cited during the trial Boulton and Watt against Bull, in 1795, by Mr. Justice Buller, who said, "It has never been directly decided that a patent for an addition may be maintained; but if the button were new, I do not feel the weight of the objection, that the coat was old; in truth, arts and sciences at that period were at so low an ebb, in comparison with their present state, that I do not think that case ought to preclude the question." And by Lord Chief Justice Eyre, who said, "The principle on which that case was determined has not been adhered to." Also cited during the trial of Hornblower against Boulton and Watt in error, 1799, by Mr. Justice Grose, who said, "If that decision were to be considered as law at this day, it would set aside many patents for very ingenious inventions, in cases where the additions to manufactures before existing, are much more valuable than the original manufactures themselves. Lord Coke's opinion seems to have been formed without due consideration, and modern experience shows that it is not well founded."—Coke's Institutes, 3d part, c. 85.

An Act for confirmation, as well of all Grants made to the Queen's Majesty, as of Letters Patent made by her Majesty to others.—1576. 18 Eliz. c. 2.

A patent was granted by Queen Elizabeth, for printing a book. Printing began in England, 1474.—1591.

An act for explanation of a statute made in the 34th year of King Henry VIII. as well touching grants made to his Majesty, as for confirmation of letters patent made by his highness to others, (chiefly of abbey lands.)—1593. 35 Eliz. c. 3.

An act for confirmation of grants made to the Queen's Majesty, and of letters patent made by her highness to others.

Letters patent shall be expounded beneficially for the patentee: patents decreed to be void by act of parliament, or by courts of law; monopolies.—1601. 43 Eliz. c. 1. exp.

A great debate took place in the House of Commons concerning monopolies. It appears from the speeches made on this occasion, that an excessive public grievance then existed, from the multiplication of letters patent for monopolies of almost every branch of trade and manufacture. The following were mentioned, amongst others: salt, aquavitæ, vinegar, alegar, train oil, oil of blubber, brushes, bottles, pouldavy, oade, starch, Irish yarn, calf skins and felts, steel, leather, cards, glasses, saltpetre, &c. &c. There was very little difference of

opinion as to the grievances, for each speaker cited some from his own knowledge; but as to the remedy, they debated whether it should be by bill, or by petition to her Majesty; the latter was adopted.

The following is an extract from the speech of Mr. Francis Bacon, the Attorney-General (afterwards Lord Chancellor Verulam.) "The Queen, by her prerogative, has both an enlarging and restraining power, for she may set at liberty things restrained by statute law, or otherwise, or she may restrain things which be at liberty; for the first, she may grant *non obstante* contrary to the penal laws; for the second, if any man out of his own wit or industry finds out any thing beneficial for the commonwealth, or brings in any new invention, which every subject of this kingdom may use, yet in regard of his pains and travel therein, her Majesty perhaps is pleased to grant him a privilege to use the same, only by himself or his deputies, for a certain time; this is one kind of monopoly. Sometimes there is a glut of things, when they be in excessive quantity, as of corn; or sometimes there is a scarcity, or a small quantity; and accordingly her Majesty gives licence of transportation or of importation: this is another kind of monopoly. These, and divers of this nature, have been in trial at common pleas upon actions of trespass, and if the Judges find the privilege good, and beneficial to the commonwealth, they will allow it; otherwise, disallow it. Since the last Parliament, her Majesty herself hath given commandment to her attorney-general to bring divers of them into the Exchequer; and at least fifteen or sixteen have been repealed, some by her Majesty's own express commandment, upon complaint made unto her by petition, and some upon *quo warranto* in the Exchequer."

The Queen sent a message to the House, importing that the monopolies should be revoked; whereupon an address of thanks was voted; it was delivered to her Majesty by the Speaker, attended by about 180 members, on the 30th Nov. 1601. The following is an extract from her Majesty's answer:—"I never put my pen to any grant but upon pretence and semblance made unto me, that it was both good and beneficial to the subjects in general, though a private profit to some of my ancient servants who had deserved well; but the contrary being found by experience, I am exceedingly beholden to such subjects as would move the same at first."—"That my grants should be grievous to my people, and oppressions to be privileged under colour of our patents, our kingly dignity shall not suffer it; and when I heard of it, I could give no rest to my thoughts till I had reformed it."—1601. 20th November. See Parliamentary History, vol. 4, p. 452.

The case of Darcy against Allien was tried before Chief Justice Popham, (Trinity Term.)—1602. 44th Elizabeth. Year Books, lib. 2. p. 84.

It was on an infringement of a patent recently granted by Queen Elizabeth to Edward Darcy, groom of the chamber, for the importation and manufacture of playing cards. The patent was set aside as a monopoly against both the common and the statute law.

Sir E. Coke says, the judgment given in this case was the principal motive of the publishing of the King's Book (1610,) as is mentioned in the preamble of the Act 21 Jas. I, and that book was a great motive of obtaining the Act to be passed.—See Coke's Institutes, Part 3, c. 85.

A Proclamation by King James I. against Saltpetre-men, who, under colour of the King's Patent, dug up the saline materials in private houses, unless they were well feed to abstain.—1604.

(To be continued.)

French Patents

GRANTED IN JULY, AUGUST AND SEPTEMBER, 1830.

To Peter Joseph Cuvillier, at Nantes, for a tincture to conserve the hair. 5 years.

— Peter Bollen, Maison, for a sieve to extract the flour from potatoes. 5 years.

— Moisson Deswches Satel, Rhodes, for improvements in manufacturing iron. 10 years.

— St. Colombe, Paris, for a machine to grind colours. 15 years.

— St. Chappelle, Paris, for an hydraulic apparatus. 10 yrs.

— Barthelemi Timomuir, St. Etiénne, for a method of sewing stuffs. 15 years.

— Louis I. Auóry, Paris, for a *horgnon montre.* 5 years.

— Peter L. N. Conquèrant, Coutances, for improved water cocks. 15 years.

To Dollin Dufresnch, Metz, for a double carminative body belt. 5 years.
— M. H. Dupargue, Paris, for improved process of burning charcoal. 15 years.
— E. N. Farcau, Paris, for a process to manufacture a certain sort of paper. 15 years.
— John Anthony Favre, Lyons, for machinery to manufacture wire nails. 5 years.
— James Irving, Paris, for a new process to make impurmeable tubes. 10 years.
— A. E. Jaccand, Lyons, for a means to preserve the grease in wheels. 10 years.
— Benj. Layel, Paris, for improvements in iron rail roads. 5 years.
— Louis, A. Darche, Paris, for some economical heating apparatus. 15 years.
— Galy Cazalate, Versailles, for new steam boat engines. 15 years.
— Louis Bourgignose, Paris, for machinery to cut marble. 10 years.
— Eugene Palmier, Paris, for improvements in manufacturing boring tools. 5 years.
— Bourlet d'Amboise, Paris, for a new heating article called "*racahoute*." 5 years.
— John Bouval Sr. Paris, for a new process to dress furs. 15 years.
— T. X. Brinmeyer, Paris, for a new instrument called "*ditalharpe*." 10 years.
— A. and R. Carrick, New York (represented by Mr. Albert,) for a new water spindle. 15 years.
— Claude Champion, Besancon, for machinery to manufacture bricks. 15 years.
— Christopher Dieudormé, Paris, for a new improved saddle. 5 years.
— Charles Lefevre, Strasbourg, for several processes to manufacture bread. 15 years.
— William Newton, London (represented by Mr. Albert,) for improvements in manufacturing paper hangings. 5 years.
— John Oeckelhaenzer, Paris, for machinery to manufacture paper. 15 years.
— I. H. de Rigault, Paris, for a machine he calls "*air, water and fire*." 15 years.
— Louis Jerome Perrot, Rouen, for machinery to print stuffs. 5 years.
— Francis R. Roux, Avignon, for an economical furnace. 10 years.

To Sorel, Paris, for a new system of steam engines. 10 yrs.
— M. H. Sweny, London, for a new compound metal for ship linings. 15 years.
— Philip Taylor, Paris, for improvements in manufacturing sail cloth. 15 years.
— Viviant Son, Paris, for a new system of coaches, he calls "*impulsive.*" 10 years.
— Lacombe Son, Paris, for improvements in silk spinning. 5 years.
— Chapuy and Marsaux, Paris, for a static lamp, he calls "*Chronometre.*" 10 years.
— Mrs. Degrand, Marseilles, for an apparatus to filter syrups. 10 years.
— Berdot Lalannet, Paris, for the application of exotic wood to dress. 10 years.
— J. B. Laignel, Paris, for a process to warm coaches. 5 yrs.
— P. M. Robin, Paris, for a new steam coach. 10 years.
— De Malortie, Rouen, for a colour mill. 15 years.
— Herrisson and Garnier, Paris, for a machine called "*pulsometre.*" 10 years.
— Maurice de Jongh, Manchester (represented by Mr. Albert,) for a self spinning mule. 15 years.
— Cholat Father, St. Étiénne, for a process to apply marks upon the silk warps. 5 years.
— John Meric, Paris, for a new machine to raise water. 5 years.
— Mathes, brothers, Bordeaux, for a machine to heckle flax, &c. 10 years.
— Camilie Ployel, Paris, for a harmonical table in pianos. 5 years.
— John Francis Godin, Paris, for an improved silos or cistern. 5 years.
— Caillaux, Paris, for improvements in the manufacture of animal black. 5 years.
— Cordier Lalande, Paris, for a new lamp "*oliostatique.*" 5 years.
— Isaac Winslow, Havre, for improvements in spinning machinery. 5 years.
— Charles Heiddoff, Paris, for a new inking machine to printers' presses. 10 years.
— F. A. Camus, Paris, for an economical process to heat bakers' ovens. 15 years.
— James N. L'Epine, Paris, for a portable gas apparatus. 10 years.
— Miles Berry, London (represented by Mr. Albert,) for an evaporating apparatus for sugar boiling. 10 years.

To E. Avery Lester, Boston (represented by Mr. Albert,) for pendulem engine. 10 years.
— Auguste Guille, Quinton, for a process to embroider in looms. 5 years.
— Bainest and Pinet, Paris, for a machine to take off the husks of grains. 5 years.
— Dolfus Meig, and Co. Mulhauson, for improved self-moving temples. 10 years.
— Paul Garnier, Paris, for a new escapement in clocks. 5 years.
— Ch. A. Gingembre, Paris, for a steam kitchen. 10 years.
— A. Pauwels, Cit, Paris, (represented by Mr. Albert) for a new propelling machine. 15 years.
— A. H. Renette, Paris, for shooting cartridges. 5 years.
— Van Maarsel, Brussels, for machinery to manufacture nails. 15 years.
— Jean Zuber, and Co. Rishuin, for a machine to manufacture continual paper. 15 years.

New Patents Sealed in 1830.

To John Revere, of Weybridge, in the county of Surrey, Doctor of Medicine, for his having invented a new and improved method of protecting iron chain cables, iron boilers, and iron tanks, from the corrosion produced upon them by the action of water.—Sealed 27th Nov. 2 months.

To William Church, of Hawood House, in the county of Warwick, Esq. for his having invented or discovered certain improvements in apparatus applicable to propelling boats, and driving machinery by the agency of steam, parts of which improvements are also applicable to the purposes of evaporation.—29th Nov. 6 months.

To Robert Dalglish, jun. of Glasgow, calico printer, for his having invented improvements in machinery or appa-

ratus for printing calicos and other fabrics.—6th December 6 months.

To Henry Blundell, of the town of Kingston-upon-Hull, in the county of the said town, merchant, for his having invented improvements in a machine for grinding or crushing seeds and other leaginous substances, for the purpose of abstracting oil therefrom, and which machine, with certain improvements or alterations, is applicable to other useful purposes.—6th Dec. 6 months.

To Richard Edwards, of Dewsbury, in the county of York, feather and flock seller, for his having invented an improvement on, or substitute for glass, sand, emery, and other scouring paper or substances.—6th Dec. 6 months.

To Samuel Brown, of Billiter-square, in the city of London, Commander in the Royal Navy, for his having invented certain improvements in the means of drawing up ships and other vessels from the water on land, and for transporting or moving ships, vessels and other bodies on land from one place to another.—6th Dec. 6 months.

To John George Lacy, of Camomile-street, in the city of London, gun manufacturer, and Samson Davis, of East Smithfield, in the county of Middlesex, gun lock maker, for their having invented a certain improvement or improvements in the construction of guns and fire arms.—6th Dec. 6 modths.

To John Dixon, of Wolverhampton, and James Vardy, of the same place, for their having invented certain improvements in cocks for drawing off liquids.—13th Dec. 2 months.

To Thomas Wamsley, of Manchester, manufacturer, for his having invented certain improvements in the manufacture of cotton, linen, silk and other fibrous substances, into a fabric or fabrics applicable to various useful purposes.—13th Dec. 6 months.

To William Needham, of Longnor, in the county of Stafford, Gentleman, for his having invented certain improvements in machinery for spinning, doubling, and twisting silk and other fibrous substances.—13th Dec. 6 months.

To Samuel Parlour, of Croydon, in the county of Surrey, Gentleman, for his having invented certain improvements on lamps, which he denominates Parlour's improved table lamps.—13th Dec 2 months.

To John Lee Benham, of Wigmore-street, in the county of Middlesex, ironmonger, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of certain improvements on shower and other baths.—13th Dec. 6 months.

To Richard Witty, of Basford, in the parish of Wolstanton, in the county of Stafford, engineer, for his having invented or found out certain improvements in apparatus for propelling carriages, boats, or vessels, and for other purposes by the power of steam.—13th Dec. 6 months.

To Bartholomew Redfern, of Birmingham, in the county of Warwick, gun-maker, for his having invented or found out a lock, break off, and trigger, upon a new and improved principle for fowling piece, muskets, rifles, pistols and small fire arms of all descriptions.—17th Dec. 2 months.

To Augustus Graham, a citizen of the United States of North America, but now residing in West Street, Finsbury, in the City of London, gentleman, in consequence of a communication made to him by a certain foreigner residing abroad, for certain improvements in the application of springs to carriages.—17th Dec. 6 months.

CELESTIAL PHENOMENA, FOR JANUARY, 1831.

D.	H.	M.	S.	
1	17	0	0	☾ in conj. with *a* in Leo
2	4	0	0	☾ in conj. with ρ in Leo
3	3	0	0	☾ in conj. with σ in Leo
3	11	0	0	♂ in conj. with 1 ξ in Pisces
4	21	0	0	☾ in conj. with 1 γ in Virgo
5	0	0	0	Clock before the ☉ 5 *m.* 38 Sec.
5	10	54	0	☾ in □ last quarter
8	15	0	0	☾ in conj. with γ in Libra
9	2	0	0	☾ in conj. with ψ in Libra
9	19	0	0	☾ in conj. with φ in Oph
10	0	0	0	Clock before the ☉ 7 *m.* 42 Sec.
10	21	0	0	☿ in conj. with ♅ long. 9° in Cap. ☿ lat. 51' S. ♅ lat. 37' S. diff. lat. 14'
12	18	0	0	♀ in conj. with ♃ Long. 28° in Sagitt. ♀ lat. 1° 7' S. ♃ lat. 23' S. diff. of lat. 44'
13	0	0	0	☾ in conj. with *d* in Sagitt
13	13	37	0	Eclip. conj. or ● new moon
13	21	0	0	☿ in conj. with δ in Cap.
15	0	0	0	Clock before the ☉ 9 *m.* 38 Sec.
15	2	0	0	☽ in conj with ☿ Long. 12° in Cap. ☽ lat. 1° 44' N. lat. 30' N. diff. of lat. 1° 14'
17	0	0	0	♄ Stationary
20	0	0	0	Clock before the ☉ 11 *m.* 16 Sec.
20	5	33	0	☉ enters Aquarius
20	7	0	0	☽ in conj. with ν in Pisces
20	19	29	0	☽ in □ first quarter
21	4	0	0	☽ in conj. with 2 ξ in Ceti
22	4	0	0	♀ in conj. with ♅ Long. 8' in Cap. ♀ lat. 1, 19' S. ♅ lat. 37' S. diff. lat. 42'
23	3	0	0	☽ in conj. with γ in Taurus
23	8	0	0	♀ in conj. with ν in Cap.
23	9	0	0	☽ in conj. with α in Taurus
25	0	0	0	Clock before the ☉ 12 *m.* 36 Sec.
27	14	33	0	Ecliptic oppo. or ○ full moon.
29	14	0	0	☾ in conj. with δ in Leo
30	0	0	0	Clock before the ☉ 13 *m.* 35 Sec.
30	3	0	0	♀ in conj. with γ in Cap.
30	5	0	0	♀ in conj. with 2 β in Cap.
30	13	0	0	☾ in conj. with σ in Leo
31	13	0	0	♀ in conj. with δ in Cap.

The waxing moon ☽.—the waning moon ☾.

METEOROLOGICAL JOURNAL, FOR NOV. AND DEC. 1830.

1830.	Therom. Hig.	Therom. Low	Barometer. High.	Barometer. Low.	Rain in inches.	1830.	Thermo. Hig.	Thermo. Low	Barometer. Hig.	Barometer. Low.	Rain in inches.
Nov.											
26	41	23	30,10	29,89		11	40	30	29,25	29,18	
27	43	31	29,85	29,64		12	39	26	29,83	29,31	
28	46	34	29,56	29,46	,375	13	35	26	30,14	30,06	
29	45	37	29,82	29,71		14	41	22	30,32	30,26	
30	45	40	29,86	29,85		15	39	28	30,36	30,28	
Dec.											
1	43	38	29,95	29,89		16	36	26	30,26	30,23	
2	40	36	29,84	29,66		17	37	20	29,99	29,86	,15
3	40	34	29,56	stat.		18	35	28	30,09	30,04	
4	40	34	29,74	29,63		19	39	27	29,98	29,66	,05
5	43	35	29,71	29,46		20	43	32	29,65	29,40	
6	48	33	29,14	29,10	,05	21	40	32	29,76	29,69	
7	48	44	29,14	29,12		22	49	36	29,54	29,34	
8	46	40	29,16	stat.		23	33	28	29,46	29,36	
9	49	40	28,94	28,90	,35	24	25	14	29,39	29,30	
10	42	38	29,16	28,96	,225	25	24	35	29,34	stat.	

Edmonton. *Charles Henry Adams*

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXV.

[SECOND SERIES.]

Recent Patents.

To Orlando Harris Williams, *of North Nibley, in the county of Gloucester, Esq. for his invention of certain improvements in the paddles and machinery for propelling ships and other vessels on water.*—[Sealed, 7th January, 1829.]

These improvements in the paddles and machinery for propelling ships and other vessels on water, have for their object, first, a method of constructing and enlarging the propelling surfaces, for the purpose of accommodating them to the draft of the vessel. Secondly, saving that sacrifice of power which is expended in working the ordinary paddle wheels, at the points of entering and leaving the water. Thirdly, the capability of obtaining a more effective and direct stroke of the paddle, with the smallest amount of lateral resistance in every part of its rotatory progress.

These objects are effected by the peculiar construction of radial paddles, exhibited in the accompanying drawings; the particulars of which will be fully understood by the following explanation thereof:—

Fig. 1, Plate X, represents one of the paddles or propelling arms, any convenient number of which arms and paddles are intended to be mounted in radial positions in a paddle or carrying wheel, in the manner shown in fig. 2, or they may be placed in any other way suited to propelling vessels on water.

Fig. 3, is a section taken vertically through the carrier wheel and guide ring, shewing the positions of the paddle arms and paddles; the same letters referring to similar parts in all the figures.

I make the paddles of metal or wood, or of any other suitable substance, by attaching two plates, sheets or boards together, by means of bolts and screws, the bolts passing through the stretchers or forked parts of the paddle arms.

In fig. 1, it will be seen, that the paddle consists of two wooden boards bolted together; and in order to increase the length of the paddle, one of the boards is made to shift, so that it may be slidden upward or downward, and the surface elongated to any required dimensions, by passing the bolts through other holes, and then screwing up the nuts tight; when the paddles are constructed of metal, which, in general, I should prefer, I make them of plates or sheets of iron or other metal, bent or cast into the form shewn in the section, fig. 6, that is slightly concave in the middle of their outer surfaces, and bevelled on their edges to a thin feather or angular edge. These plates may be connected together by bolts passed through the forked stretchers of the paddle arms, and may be elongated when required, in the same way as the wooden paddle boards above described; or, if found requisite, I can, in like manner, enlarge the breadth of the paddles, by shifting the boards, plates or sheets, in lateral directions; the modes of doing which are shewn in the sectional figures, 7 and 8. Having described the

modes of enlarging the propelling surfaces, I now proceed to explain the manner in which I avoid the perpendicular resistance the ordinary paddles are subject to, in entering and leaving the water. This object is effected by what may be called feathering the oar or paddle, that is causing it to enter the water edgewise, and then to turn so as to present its broad surface to the resistance of the water, for the purpose of giving the propelling stroke. In fig. 2, there is a series of paddles, *a, b, c, d, e, f, g, h,* shown, mounted on turning or moveable arms; *c, c, c,* c, &c. placed in radial positions, in a paddle wheel or circular carrier; *i, i, i,* which is affixed to the main rotatory shaft *k,* connected to the engine or other first mover; behind this paddle or carrier wheel, there is a circular guide surface or stationary ring *a, a, a,* fixed to the vessel, which is shewn detached at fig. 4. Against this circular ring or surface, the guides *b, b, b, b, b, b,* which keep the paddles in their proper positions during their rotatory course, are intended to slide: fig. 5, shews portions of the edge of the guide ring *a, a, a,* upon which the guides *b, b, b,* are intended to slide.

These guides are fixed on the arms *c, c, c,* of the paddles, by keys or otherwise, as shown in the drawings; they may be made as crosses, in the way represented, or squares, or of any other shape, provided the guide of each paddle has four surfaces at right angles to each other, capable of sliding upon the face of the ring *a,* as the paddle or carrier wheel traverses round, which guides are for the purpose of preventing the paddle arm from turning, and consequently keeping the paddle fixed in its position as it passes round with the carrier wheel; upon each of the paddle arms *c, c, c,* there is also affixed a cross-armed wiper or tappet *d, d, d,* which, when it comes in contact with a stationary projecting piece or cam *b,* (shewn affixed to the side of the guide ring) turns the paddle arm one quarter of a rotation.

This operation will be rendered perfectly evident, by reference to the three positions of the guide, the tappet and the paddle,

(the latter of which is shewn by dots) in the edge views of the guide ring, fig. 5, supposing the paddle to be proceeding edgewise, which it does on entering the water; the guide *b*, sliding against the surface of the ring *a*, the tappet and paddle would then assume the position shewn at *a*, in figures 2 and 5.

As the paddle proceeds further in its circular course, the tappet comes in contact with the projecting piece or cam *e*, which turns it over as at *b*, in figures 2 and 5, and having passed the projecting piece or cam, another part of the guide comes into contact with the surface of the guide ring, and the paddle then presents its broad face to the resistance of the water as at *c*, fig. 2 and 5, which is the propelling position. It may be necessary to remark, that there are small holes or recesses; *g*, *g*, in the guide ring behind the projecting pieces or cams, as seen in fig. 4, and shewn by dots in fig. 5, for the purpose of allowing the angles or projecting parts of the guides to sink into the ring at those points where the paddle arm turns over one quarter of a rotation. The paddle having performed its full stroke, which I recommend to be in the space of about 55 degrees of the entire rotation of the carrier wheel, the tappet comes into contact with another projecting piece or cam *f*, (see fig. 4,) and the paddle is again turned one quarter round, so that it passes out of the water edgewise, as it entered it.

The situation of these cams or projecting and stationery pieces *e*, and *f*, determine the points at which the paddles shall be turned, from the edgewise positions in which they respectively enter the water, to that of presenting their broad surfaces against the water for giving the propelling strokes, and of again turning and passing out of the water edgewise. I do not, therefore, confine myself to placing the projecting pieces or cams in the precise situations shewn in the drawings, though I believe those situations to be best for the general performance of the paddles or propellers. In the drawings above referred to, I have supposed the wheels to which my improved paddles are attached, as acting perpendicularly on the sides of a vessel, and

impelled by steam or any other power; it is not, however, necessary to limit them to any particular situation, as they may be applied at the head or the stern of a vessel, or even in the interior, working through the sides or bottom, provided the vessel was constructed in a proper way to allow of their working effectually in those situations. Under a suitable arrangement, these improved paddles might also be made to propel vessels, by acting against the air or wind, by being mounted on a carrier wheel, placed horizontally or otherwise, and driven round by any adequate power, as by manual labour of the crew of the vessel, or any other means, in which situations the paddles in succession, might be brought to act and bear against the air or wind, and by that means propel the vessel forward.

If under any circumstances, as to the want of fuel or other cause, it should be necessary to suspend the operations of the paddle wheels, and to employ the sails only, it will be desirable to bring the lower paddle, which is immersed in the water, to an edgewise position, in order that it may not impede the course of the vessel, and that its feather edge may cut its way through the water. This may be done, by twining the upper paddle arm, which stands perpendicularly, from its position one quarter round, and then twining the paddle wheel until this paddle arm has passed over the first projecting piece or cam, and when the paddle arrives at the lower part of the wheel, it will have been brought edgewise, and not into the propelling position, as above described, but in a position to cut the water. A plug, as at A, fig. 4, is inserted into a hole at the upper part of the guide ring, which, on being removed, allows the arm to be turned round, for the above described purpose.

In order to repair any accidental fracture in any of the paddles, I propose to connect them to the arms by sockets and bolts, so that any one may be readily removed, and another paddle mounted in its place.

The same contrivance of a turning paddle, may also be adopted with great advantage to the floats of tide wheels and

other under-shot water wheels, for the purpose of escaping the back water; but as the construction of such wheels must vary according to circumstances, I do not think it necessary to exhibit in the drawing, any method of applying the improved paddle or float thereto, as my invention consists in the contrivance for turning the arm of the paddle or float in the manner above described.

In describing these my improvements in the paddles and machinery for propelling ships and other vessels on water, and in under-shot water wheels, I have necessarily exhibited many parts which are not new in their application; I therefore wish it to be understood that my improvements consist in these two particulars; first, the described method of constructing and increasing the surfaces of the paddles, or propellers, or floats; and, secondly, the mode of guiding and turning the paddles or floats, by means of the peculiarly constructed guides and tappets fixed on the arms, and the peculiarly constructed guide ring and projecting pieces or cams, for directing their action, which are fully set out in the drawings hereunto annexed, and described as above.—[*Inrolled at the Rolls Chapel Office, July,* 1829.]

Specification drawn by Mr. Newton.

To Robert Crabtree, *of Halesworth, in the county of Suffolk, gentleman, for his invention of a machine or apparatus for propelling carriages, vessels, and locomotive bodies.*—[Sealed 4th July, 1829.]

This invention is a mode of propelling locomotive bodies by means of legs which project out behind, their ends bearing on the ground, are acted upon by machinery, and cause the body to run forward; we give the specification in the words of the Patentee, " The invention consists in

a machine apparatus, or arrangement of mechanism, which is put in motion by means of a pendulum or lever acting upon two lever chains, or systems of levers, commonly called Lazy Tongs, which, by their alternate, expansive and contractive motion in propelling weights to and fro upon a main beam, balance or lever, act by means of crank rods upon the cranks of paddle-wheels in relation to vessels, and upon common wheels in relation to carriages, and upon toothed wheels, drums, straps or bands in relation to fixed machinery; and also by means of propellers in relation both to vessels and carriages, thereby producing progressive motion. And in further compliance with the said proviso, I, the said Robert Crabtree, do hereby describe the manner in which my said invention is to be performed, by explaining one of its applications, namely, that which serves for propelling vessels, and for which description it will be necessary to refer to the drawings annexed hereto, and to the letters marked thereon (that is to say),

Description of the Drawings.

" Plate XI fig. 2, represents a side elevation of such an application as aforesaid of my said invention, in a quiescent state; *a, a,* is the main lever, composed of two parallel boards or planks, leaving an interval between them for the lever chains to traverse backwards and forwards; *c, c,* are two lever chains, working between the two sides of the main lever. They are confined at one of their ends in the centre of the main balance lever, by a bolt passing through the main lever, and are supported at the other ends by the axles of wheels or rollers, marked *d, d,* shown by dots; to which wheels or rollers, by their alternate contraction and expansion, they give a motion to and from the centre, from and to the extremities of the

main beam balance or lever. These wheels or rollers *d, d,* move between two weights of iron, lead or other ponderous materials, marked *e, e,* in the form of desks or any other convenient shape, which are fixed on the ends of the axes of the rollers, and by their motion to and fro, depress and elevate the main balance or lever alternately, as shown in the drawing, fig. 3; *f,* represents an iron or other bar or rod, fixed at each end to a bolt or pivot of the lever chains, and by its alternate action produced by the oscillations of the pendulum or lever *g,* next hereafter described, expands and contracts them; *g, g,* is a lever or pendulum, working on the bolt *h,* fixed in the upright frame *k,* the upper end of the short arm of which lever is connected by a bolt or pivot, with two iron or other bars *i, i,* the other ends of which bars communicate in like manner with the bolt at each end of the bar or rod *f,* and by its motion expands and contracts the lever chain; *k, k,* is a stand or frame, supporting the machinery; *l,* is a paddle wheel, which is put in motion by the two crank rods *m, m,* which communicate at their upper ends with the main lever, and at the lower end are attached to a double crank *n,* upon the axis of the paddle wheel; *o, o,* are legs or propellers, working at their upper ends upon bolts on the main lever, and which may be used in canals, where the depth of the water is nearly uniform; *p, p,* are feet, in which the lower ends of the propellers work upon bolts or pins; *q, q,* represent the desk of the vessel; *r, r,* are frames at each end of the machinery, each composed of a double upright, with braces, and their use is to guide and keep steady the main lever, the extremities of which work between them; *s, s,* is the water line; and *t, t,* the bottom of the canal or river.

"The aforesaid drawings and description apply more directly to the action of the machine, in propelling vessels

and other floating bodies; but it is obvious that the same mode of operation equally applies to the propelling of carriages and other locomotive bodies upon land; for which purpose nothing more is necessary than to apply the cranks to the axis of carriage wheels, instead of the paddle wheels, or to propel them by the action of the main lever on the propellers *o, o*. And, lastly, I do hereby declare, that the drawings hereinbefore described, is intended to represent my said invention, as calculated to be moved by manual labour; but that I claim and reserve to myself the liberty of using any of the known mechanical and moving powers for the purpose of putting the said machine or apparatus in motion."—[*Inrolled at the Rolls Chapel Office, January,* 1830.]

To JOHN BRAITHWAITE *and* JOHN ERICSSON, *of the New Road, in the county of Middlesex, Engineers, for their invention of an improved method of manufacturing salt.*—[Sealed 27th February, 1830.]

WE give the description of the invention in the words of the Patentees.

"We, the said John Braithwaite and John Ericsson, do hereby describe the nature of our said invention to consist in heating brine, from which salt of any required quality is to be manufactured in a close boiler, to any degree of temperature above that necessary to produce the same quality of crystallization by the ordinary method; and also, while the said brine is under pressure, in such manner as to prevent crystallization or precipitation of salt in the boiler in which it is so heated, and thence running into large open shallow vats or vessels, which we

call evaporators, elevated above the boiler, and not acted upon by the fire, where the aqueous particles being allowed to evaporate, and the brine becoming of a lower temperature than that in the boiler, the salt crystallizes, and precipitates to the bottom of the vat, by which improved method of manufacturing salt, we prevent the formation of what is usually called pan scratch or pan crust, and effect an important saving in fuel; and, in further compliance with the said proviso, we the said John Braithwaite and John Ericsson, do hereby describe the manner in which our said invention is to be performed, by the following description thereof, reference being had to the drawing annexed, and to the figures and letters marked thereon (that is to say):

Description of the Drawing.

"Plate X. fig. 9, is a plan of our said invention; *a*, is a boiler, with parts represented as broken away, the better to show its interior arrangement; *b*, represents the fire bars; *c, c*, the furnace door; *d, d, d, d*, is the flue, with cleansing doors, as at *e*, through which to clean it out; *f*, is a man hole; *g*, is the end of the flue, which goes into the chimney; *h*, is a supple pipe, to feed the boiler with cold brine; *i*, is a cylinder, fitted on to the top of the boiler, for purposes hereinafter described; *j*, is a driving pulley, to turn a shaft or spindle working within the cylinder, to be also hereinafter explained; *r*, is a conduit pipe, through which the heated brine from the boiler, after having been brought into a cylinder, *i*, runs into *l, m*, which is a large shallow vat or vessel, called by us an evaporator, with a longitudinal division at *o*, and a transverse one at *p*, the use of which divisions will hereinafter be more particularly explained; *q, r*, and *s*, are float boards to limit the evaporating surface of the brine in the

evaporator; *t*, is a pipe serving to connect the evaporator with the boiler, and leading from the evaporator to the bottom of the boiler.

"Fig. 10, is a section of the pipe, as also of the boiler and of the side *m*, of the evaporator, supposed to be taken from *a*, to *e*, of fig. 9, showing the course the brine is compelled to take under the transverse division *p*; the object of this division, and the well *w*, is to prevent the salt, which is forming in the evaporator, to be carried into the boiler.

"Fig. 11, is an end view of the boiler and evaporator, and as the same letters are used to denote similar parts in all the figures, it will only be necessary to state that *x*, is a second man hole in the boiler; then refer to the explanation of the other figures, to explain the parts in this figure, which are similarly lettered.

"Fig. 12, is a section of the boiler, the cylinders *i*, the pipe *k*, and the side *l*, of the evaporator, supposed to be taken from *e*, to *r*, of fig. 9, and it will be seen that this side of the evaporator is also provided with a well *v*, but without any transverse division; *n*, is a spindle, to be driven round by the pulley *j*, carrying on its lower end the vanes or fans *y*, *y*, *y*, *y*, and supported on the step *z*; this step is fixed to a bar that stands across the aperture in the top of the boiler, which aperture communicates with the cylinder *i*, above it; *u*, *u*, is a float board, to prevent as much as possible, any evaporation taking place, except in the evaporation.

"The mode of operating with the apparatus hereinbefore described, is as follows:—

"The apparatus being filled with brine, as shown in the figures, and a fire being lighted in the furnace, the column of brine in the cylinder *i*, will keep the brine in the boiler constantly under pressure, and thus it may be always

heated to any temperature higher than that in the evaporator, while the boiler being completely filled, no evaporation can take place therein, and consequently no salt will be formed there, to become pan scratch or pan crust. When the brine in the boiler begins to heat, the fans *y, y, y, y,* must be turned by means of the pulley *j,* and a driving-strap, when a portion of brine will be displaced, which will pass through the pipe *k,* into the evaporator, and the quantity so displaced, being replaced by a portion out of the boiler, a corresponding portion will flow from the evaporator into the boiler, through the pipe *i,* and thus a constant circulation of brine will be kept up, which, as soon as it flows beyond the float-board *q,* where the evaporation first takes place, will begin to deposit salt, which may be raked up in the ordinary way; as the quantity of brine on the apparatus diminishes, cold brine is to be admitted to the boiler, through the feed-pipe *h,* and it is only necessary further to observe, that the temperature required for the particular quality of the salt to be produced, must be regulated by the extent of the evaporating surface exposed in the vat or evaporator.

"Now, whereas other formed boilers and evaporators may be used, and the contrivance for raising the brine from the boiler may be a pump or other known engine, but whereas we claim as our invention the manufacturing of those qualities of salt, the variety of which depends upon the temperature at which the crystal is found, by heating brine in a close boiler under pressure, to a degree of heat above that which would be required to form the same quantity of salt by the ordinary method, and then causing such brine, so heated aforesaid, to pass from a close boiler into an open vessel, for the purposes of evaporation, at a distance from, and not acted upon by the fire, where the required temperature is obtained, and

thence, when too much cooled, to deposit salt of the quality required, to return into the boiler, to be again heated to its former temperature, and again passed into the open vessel, thus keeping up a constant circulation of brine through the close boiler and open vessel, and a consequent constant deposit of salt.

To THOMAS COBB, *of Calthorpe House, near Banbury, in the county of Oxford, Esq. for his invention of certain improvements in the manufacture of paper, intended to be applied to the covering of walls or the hanging of rooms, and in the apparatus for effecting the same.*—[Sealed 15th September, 1829.]

THE invention for which this Patent is granted, is a mode of producing an embossed surface of papers intended for covering walls of rooms, by which a beautiful effect can be produced on papers, which are coloured in the pulp, and not stained after the paper is made, as is usual with paper hangings; and by which also silks, velvets or other coloured goods can be put upon the surface of paper, and when embossed, will produce a rich and beautiful appearance.

SPECIFICATION.

"My improvements in the manufacture of paper, intended to be applied to the covering of walls or hanging of rooms, and in the apparatus for effecting the same, consists, first, in manufacturing tinted or coloured paper intended to be applied to the covering walls or hanging rooms, by impressing them with patterns during the operation of making; secondly, embossing paper with patterns for the same purpose, after the paper is made, and which, by the pressure it receives during this operation, is made to resemble plain damask or figured silks; thirdly, in uniting two or more thicknesses of paper together for the same purpose, previously to their receiving the

embossing, one of which may be coloured paper, and the other white; fourthly, in uniting for the same purpose, paper with silks, velvets, and other fabrics, so that, if plain, they may receive an impression or pattern by embossing, and may also be struck on walls with the same facility, as paper only is commonly done; and, fifthly, in the apparatus for uniting the papers or paper, and other fabrics, as above mentioned. First, in some cases, I make a coloured or tinted paper, and in doing this, I dye or stain the rag or pulp by any of the known methods of dyeing or staining them, and make it into paper in the usual way; and during the process of manufacture, and before it is dry, I cause it to pass between rollers, and receive an impression therefrom, one or both of which rollers are engraved, stamped or impressed, or covered with something that will give the pattern or figure required, by which operation it is impressed and receives a pattern or figure, or the same thing or effect may be obtained by using plates or other flat substances, in or on which the required pattern or figure is formed, by laying them on the paper in its way to the pressing rollers, so that in passing through them, it receives the figure or impression.

"Secondly, in other instances, and particularly where I want a shining article to resemble silk, I make my paper as before described, by any of the known methods, and when dry, I pass it through rollers, one or both of which are engraved with the pattern required, and at least one of them heated, so that the impression obtained may be stronger and more shining; and it is not necessary the paper for this purpose should be always coloured or tinted in the rag or pulp during the process of manufacture, but either coloured paper so made, or paper which has been made white, and afterwards coloured by any of the known methods, will do equally well for this purpose; neither is it necessary the paper should be made in long lengths, although I prefer it so, and it may either be made so by machinery, or a number of sheets may be joined together, or sheets may be impressed by either the heated rollers or plates passed through

heated rollers, and united in putting them on the walls so as to form the pattern intended when combined. In some cases, I give part of the impression during the operation of making the paper, by which it is twilled or lined, ribbed or striped, by passing it through rollers prepared according to the purpose intended, which causes it to appear thicker than if pressed flat and smooth, and prepares it to receive a stronger impression; and I afterwards, when nearly or quite dry, pass it through other rollers, one or both of which are heated, and on which are other patterns, so that part may be shining and other parts not so; and whenever it is particularly desirable that the paper should retain its shining quality in a greater degree, I size it strongly with animal or vegetable substances, and sometimes use gums or wax therein.

"Thirdly, I contrive to unite two or more thicknesses of paper together, either during the process of making, or afterwards, by introducing between them any of the glutinous substances or articles calculated for the purpose, and one of these papers may be of any colour required for the outside, and the other may be coloured or white for the back, and may also be of a coarser and stronger description than that which is intended for the outside; and when these papers are so united, they are passed through the pattern and heated rollers, or pressed with the plates as before described, to give the pattern required, and in general I prefer these double or compound papers to those which are of one sheet or thickness, only as they take the impression and preserve the patterns better, and are less injured by the operation of pasting, in putting them upon the walls.

"Fourthly, instead of the double paper before described, I take plain or figured silks, satins, velvets, cottons, linens, or other fabrics for the one side, and unite these with paper by introducing any of the glutinous substances or articles calculated for the purpose between them, in the way before described when two or more thicknesses of paper are used; and when so united, if the article is plain and wanted to be figured, I emboss

it with any pattern required, in the manner before described, and by ribbing or twilling it, by passing it through rollers prepared to give it this appearance after it is united with the paper, I give an inferior silk the appearanee of a much more valuable one, and allow of the paper thus united being pasted and stuck on walls in the same manner, and with as great facility as though it were paper only.

"In either of the cases before mentioned, I produce the embossing effect by means of a swing press, where the figure or pattern occurs but seldom, to the screw of which press a plate with the intended pattern is attached, having a chamber above it to receive a heater, for the purpose of making the impression stronger and more lasting. With this and the other modes of embossing, I sometimes use leaf gold, or other metallic substances, so that the whole or part of the impression may be covered thereby (as in the binding of books), and in some cases I take paper which is already covered with gold, silver, or other metallic substances, and emboss and cut out the figure intended, so as to fit the impression made in embossing. In other cases, and particularly when plain silk are united with paper, I produce a pattern or effect called watering, by pressing two thicknesses or pieces together between heated rollers, or in a press face to face, so that during the operation of pressing, one may bruise the other, and produce the effect described.

"Fifthly, the apparatus for uniting the different thicknesses of paper, or uniting the paper with any other articles, may be constructed in the manner represented in the drawing annexed; *a*, shews the roller on which the paper is wound for the back of the united article, and which is weighed to prevent its running too fast and to keep the paper smooth; *b*, a large drum or cylinder covered with woollen cloth; *c*, a cylindrical brush or roller covered with woollen cloth or plush, which with the ductor roller *d*, attached to it, works at a greater speed than the drum in a box *e*, containing the paste or other glutinous mixture.

The brush and the drum are connected together by spur wheels, and to the shaft of one of them a winch and handle is attached, so that when turned by the workmen the revolving motion of the the large drum draws the paper from the roller *a*, (see fig. 1, Plate XI), which is pasted in its progress upwards by the revolving brush roller *c*; *f*, is another roller, on which the silk, paper, or other material intended to form the face or outside of the united article is wound round in the same way, as the paper for the back, and this roller *f*, is also weighted to keep the material tight in its progress over the guide rollers *g*, and *h*, one of which is a screw roller reversed in the centre, to keep the article stretched in width on its arrival at the pressing roller *i*, and this being weighted also, according to circumstances, gives the necessary pressure to the two materials about to be united, and causes them to stick together. When this operation has been effected, the united materials are rolled upon the roller *k*, which, as well as the pressing roller *i*, is moved by their peripheries bearing on the large drum, which being moved as before stated, by the workmen turning the handle or winch, the whole is put in motion, and the process of pasting and uniting proceeds, and whenever the articles united are of a description so as not to bear rolling up on the roller *k*, they are suffered to fall into the basket *l*; or without the last described apparatus, the pasting may be effected by any other convenient means.

"The patterns intended to be employed for the above purpose, admit of all the varieties of engraving and impressing, which can be used for embossing, in the manner before described, and they may be made to appear as though they were woven in the material, or embroidered or embossed thereon, according to the article which it is intended to resemble, the intention being to make paper appear like silks, cloths, &c. of greater value than itself, and to have a similar effect in improving the appearance of silks or whatever articles are united or combined with the paper; and the novelty of my invention consists in giving the improved appearance, in the manner herein

described, to papers intended to be applied to the purposes of covering walls or hanging rooms, as above stated; I do not claim any thing new in the process of making paper, further than what is described under the first head, viz. the method in which the figure or impression is given during the manufacture of the paper for this particular purpose; and though embossing has been used for various other purposes, yet I claim it as new, when applied to papers prepared in the manner described, or when united with other fabrics for the purpose of covering walls or hanging of rooms, as above said."—[*Inrolled at the Rolls Chapel Office, March*, 1830.]

Specification drawn by Mr. W. Newton.

To George Daniel Harris, *of Field Place, near Stroud, in the county of Gloucester, Clothier, for his invention of certain improvements in dressing and preparing woollen yarn, and in the cleansing, dressing, and finishing woollen cloths and other fabrics, and in the apparatus for performing the same.*—[Sealed the 15th January, 1828.]

The retension of grease and soap in the fibres of the wool, and in many instances during the process of manufacture its becoming baked and hardened, renders the cloth incapable of receiving dye so effectually as it should do, the consequence of which is, that cloths, particularly those of fine quality, when but slightly worn, become white on the edges. This defect the Patentee is endeavouring to prevent, by cleansing his yarns from grease more effectually than has heretofore been done, and of preventing the soap employed in the fulling process from entering into the fibres of the wool. It is likewise his objects, by the employment of certain elastic materials in

connection with teasles in the gig mill, to lay the pile or nap of the cloth more smoothly, and produce a more permanent lustre than has hitherto been effected by any other means.

We have much pleasure in stating of our own knowledge, that both objects have been achieved in an eminent degree by the means herein proposed, and that the cloths so treated not only look better, but wear better than any cloths which we have seen of a similar quality. The following is the

SPECIFICATION.

These improvements in dressing and preparing woollen yarns, and in cleansing, dressing and finishing woollen cloths and other fabrics, and in the apparatus for performing the same, consists of the following particulars:—

"1st. In dressing and preparing woollen yarns, I adopt a process by which, in a great measure, the grease in the wool is destroyed, and the curl of the yarn subdued and straightened. 2dly. After the cloth has been woven and soaked in an alkaline solution, and then washed in clean water in the ordinary way, I further cleanse it from the alkali, for the purpose of preventing the soap in the fulling process adhering so firmly to the cloth as it does in the common mode of proceeding. 3dly. I *cleanse, dress*, and *finish the cloth*, by the employment of certain materials never before applied to that purpose, in connection with a *gig mill*, or *other rotatory machinery*.

"In dressing and preparing the woollen yarns, I generally take the yarn in cops as it comes from the spinner; and having placed the cops in a close vessel, rendered perfectly air tight, I then put in action an air pump, which had been previously connected to the vessel by a pipe with a stop cock, and having opened the stop cock,

I work the pump, and draw out or exhaust the air from the interior of the vessel, and also the air which was confined between the coils of the woollen yarn, and between the fibres of the wool. The vessel and the yarn being now in a state of vacuum or exhaustion, I let into it a quantity of alkaline liquor through a pipe with a stop-cock, which liquor immediately insinuates itself into the pores of the woollen yarn, and destroys the grease contained therein.

"For the sake of illustrating my mode of performing the above described process, I have represented in the accompanying drawings (see Plate XII, fig. 6), a section of an apparatus, which I find to be convenient for the purpose; but I do not mean to confine myself precisely to the form or construction represented, as a close vessel of any other convenient shape would answer the purpose nearly as well; *a, a*, is a square vessel made of copper, tinned and united at the joints by screw bolts, passed through flanges. The vessel may however be of any other suitable material, and made in such a manner as workmen may deem best; and it should be placed upon standards *b, b*, in order to raise it some distance from the ground; *c, c*, is a false bottom mounted upon a perpendicular rod *d*, which is passed through the bottom of the vessel *a*, and slides through a stuffing box, for the purpose of keeping it air-tight; *e*, is the man hole of the vessel, which being opened, allows the cops of woollen yarn *f*, to be placed within the vessel, as shown (each cop having a temporary spindle previously passed through it); *g*, is a pipe leading from the interior of the vessel *a*, at the upper part, to an air pump, placed at any convenient distance; *h*, and *i*, are pipes leading from the bottom of the vessel *a*, to tubs respectively containing solutions of alkali and of acid.

"The yarns having been placed within the vessel *a*, the man hole *e*, must be closed and secured so as to

render it perfectly air-tight; the stop cock of the pipe *g*, being now opened, the air pump is to be set to work, by means of which the air will be drawn from the vessel *a*, and from the fibres of the wool, as above said. When the vacuum within the vessel *a*, is sufficiently perfect, the stop cock of *g*, must be closed, and those of *h*, opened, by which the alkaline liquor in the tub *k*, will be allowed to flow through the pipe *h*, into the vessel *a*, which by that means will be filled up to the top. This alkaline liquor, I make by dissolving a suitable quantity of potash in hot water, say about two and a half ounces of potash in a gallon of water; but I do not confine myself to those proportions, nor to the use of that particular material, as soda will answer nearly the same purpose. This liquor should be heated to about 140 degrees, Fah. more or less, according to the quantity and condition of the wool.

" The vessel *a*, being thus occupied with the hot alkaline liquor, and the yarns perfectly immersed therein, I now close the cocks of the pipe *h*, and open the cock *l*, for the purpose of letting the atmospheric air into the upper part of the vessel; the pressure of which assists the operation, causing the liquor to penetrate more perfectly into the pores of the wool; and this might, if necessary, be further promoted by the employment of an injecting pump, so as to condense a volume of air upon the surface, or by hydraulic pressure. When this hot liquor has acted upon the yarns twenty minutes or longer, according to the quality and condition of the wool, I then open the discharge cock *m*, and let the scum and oily matter, with the upper portion of the liquor, run off; I now open the cocks of the pipe *h*, again, by which means the liquor is enabled to run out of the vessel *a*, into the tub *k*. But in order to express the alkaline liquor from the yarns, I apply the power of a lever *n*, to the end of the perpen-

dicular rod *d*, which, by raising the false bottom *c*, presses the yarns against the top of the vessel *a*, and the liquor thereby expressed, runs down through the pipe *h*, into the tub below. If the grease is not sufficiently removed from the wool, and the curl subdued and straightened by this operation, it may be repeated; and after the alkali has been removed, the yarns may be washed with hot water. Instead of employing the pressing apparatus above described, the yarns may be removed from the vessel and squeezed by any other means.

"After closing the necessary cocks, I again put the air pump in operation, and having exhausted the vessel containing the yarns as before, I now introduce an acid diluted with water, for the purpose of neutralizing the alkali, which is done by opening the stop cocks in the pipe *i*, when the diluted acid passes up from the tub *o*, through the pipe *i*, into the exhausted vessel, and enters the pores of the wool. For this purpose I prefer to use sulphuric acid of about the strength of two ounces of concentrated acid in a gallon of water. This liquor may be then drawn off, and the yarns squeezed and washed in the way above described. The man hole may now be opened, and the yarns removed to be prepared and worked into cloth in the usual way.

"The yarns having been woven into cloth, and cleansed in the ordinary manner, previous to milling I submit the cloth to the action of a *weak* acid, for the purpose of neutralizing what alkali may have been left in it, which operation prevents in a great measure the soap in the fulling process entering into the fibres of the wool, and adhering so firmly to the cloth, as it does in the usual mode of proceeding. This operation may be performed by immersing the cloth in diluted acid in an ordinary open vessel; but I prefer placing the cloth in a close vessel,

and exhausting the air from it, as above described, previously to introducing the diluted acid.

"In *cleansing, dressing,* and *finishing woollen cloths,* and other similar fabrics, I attach to the ordinary gig mill, or other rotatory machine employed for cleansing, raising and dressing, a number of ribs of sponge, for the purpose of uniformly spreading the water on the face of the cloth, and creating a more equal friction against its surface, as the gig barrel revolves, which cleanses and lays the fibres of the wool, and at the same time gives lustre to the dress or finish. I also attach to the gig barrel, fillets of a material made from caoutchouc (Indian rubber.) This caoutchouc having been dissolved by Hancock's patent process, is in its fluid state, impregnated with fine grits, such as emery powder, steel filings, pounded glass, or other hard granulated substances; which material being dried, is then cut into fillets and attached to the gig barrel. The points of the grit protruding through the surface of the Indian rubber form an elastic file, which rubbing against the cloth under operation, as the gig barrel goes round, straightens the pile or nap, and gives a smooth face to the cloth.

"These materials act in a similar way when attached to the gig barrel, either in conjunction with teasles, wires or brushes, or alone, and give a much more beautiful surface and appearance to the cloth, than has heretofore been produced by any other mode of dressing. The sponge may also be employed in a dry state, in conjunction with a brushing machine, or any other apparatus for setting up the pile, or dressing and finishing the cloth, and the fillets of caoutchouc, containing the gritty material, may also be adapted to hand dressing.

"The manner in which I attach these materials to a gig

barrel, or other rotatory apparatus, is shown in the accompanying drawing (see Plate XII, figs. 7 & 8); but I do not mean to confine myself to that particular mode of adapting the materials, as many other modes of mounting or fixing pieces of sponge, and fillets of Indian rubber to a revolving apparatus, may be devised to answer the purpose nearly as well.

" Fig. 7, is a representation of a portion of the periphery of a gig barrel; fig. 8, is an end view of the same, with the above described materials attached thereto. The gig barrel, as usual, is made by circular rings of iron *a, a,* attached by means of arms to an axle, upon the periphery of which rings are fixed; the gig boards or plates *b, b,* containing the teasles *c, c,* as in the common way. By the side, or in any convenient situation contiguous to the gig board, I attach the boxes or frames *d, d,* in which I propose to place the ribs of sponge. These boxes or frames I make of plate iron, and mount them upon springs *e, e*; in order to afford elasticity, I usually stretch the pieces of sponge over small sticks, to which they may be secured by strings sewed through. These sticks, with the sponge, I place in the frames as shown at *f, f,* the backs of the frames being cut into teeth, and the opposite sides of the frame pressed up by screws, in order to make the sponge fast. In this or any other convenient way, the sponge being attached to the gig barrels, and raised a little above the teasle guard, as the gig barrel revolves, the sponges will work against the surface of the cloth, and produce the effect above described. The fillets of Indian rubber made in the manner above described, I propose to attach to the gig barrel, by fixing them on to boards as at *g, g,* the sides of the material being held fast upon the boards, by indentation or teeth cut in side plates, which

are turned over, and I fasten these boards *g*, to the gig plates or boards by spring catches, or by any other convenient contrivance.

"From the above description it will appear that the principal object of my invention, and that which I claim under my aforesaid patent, is the above described process of introducing alkali and acid to the wool by the agency of a vacuum; and the new application of sponges and Indian rubber as above described.—[*Inrolled at the Rolls Chapel Office, July,* 1828.]

Specification drawn by Mr. Newton.

To AUGUSTUS WHITING GILLET, *of Birmingham, in the county of Warwick, Merchant, in consequence of a communication made to him by George Bridgman, a Foreigner residing in New Haven, Connecticut in the United States of North America, for a certain invention or improvement in the construction and application of wheels to carriages of pleasure, or of burden, or to machines for moving heavy bodies.*—[Sealed the 4th of November, 1830.]

THE Specification of this invention is described in the following manner:—

SPECIFICATION.

"These improvements in the construction and application of wheels to carriages of pleasure, or of burden, or to machines for moving heavy bodies, consist in the adaptation of what may be called *perpetual railway* to carriages of different kinds, which is formed by a circular rib or rail placed round the interior of the felloe of the wheel, and upon which circular rib a small wheel with a grooved periphery is intended to run, which small wheel bearing its portion of the burthen of the carriage, by running upon a smooth even surface, greatly

facilitates the progress of the carriage when the larger or running wheel passes over heavy or uneven ground.

"Plate XI. fig 4, is a side elevation of a railway carriage or tram waggon, with the improvement adapted thereto. Fig. 5, is a back view of the same; and fig. 6, is a transverse section of the waggon and of the wheels, the similar letters referring to corresponding parts in all the figures; *a, a, a,* is the running wheel of the carriage; *b, b, b,* the circular rib or rail of iron, which is attached to the interior of the felloe of the wheel within the range of the spokes; *c, c,* the main axle tree of the carriage, the extremities of which pass through the boxes and naves of the wheel as usual, and are key'd or otherwise secured at the outer ends, to prevent the wheel from coming off. The only peculiarity in this part is that the interior of the box of the wheel is made something larger than the axle, in order to allow the axles a small degree of play or free action. A bar of iron *d, d,* is passed under the carriage as a strengthener, and from the ends of this bar, there are bent pieces *c, c,* the ends of which form the axles of the small wheels *f, f.* These small wheels may be made with any number of spokes, or they may be solid iron rollers; the only peculiarity is that they must have a flute or groove round their outer rim or periphery, suited to the form of the circular bar or rib *b,* upon which the wheel runs.

"It will now be perceived that though the running wheels *a, a,* pass over the ground as in ordinary carriages, yet the weight of the carriage and its burthen is borne by the small wheels, and consequently, though the large running wheels should pass over soft, heavy, or uneven ground, the wheels which actually bear the weight, and upon which the carriage travels, move upon a smooth, even, perpetual railway, on which there is little or no resistance. This contrivance is equally applicable to the wheels of any kind of carriage, and is only shown in the drawing as adapted to a tram waggon, for the purpose of illustrating its peculiar construction and adaptation, The original inventor further explains his invention in these words:—

"The wheels are or may be constructed in the common form, and of the same materials as of the common cart or carriage wheel, with the exception that one set or class of wheels (for a cart or carriage) are concave on the periphery, and the other set are convex, both on the periphery, and inner circumference of the rims of the wheels; likewise that one set must not be larger than to admit of their moving in their whole diameter, between the axle and inner circle of the rim of the others. It follows of course, that one set of wheels will be more than as large again as the other set for the same vehicle, and likewise that there will be double the number of wheels to a carriage, that would be required in the common method of applying wheels. In the application of the wheels, there are two applied where there is usually one, the smaller one as above mentioned, moving in the inner circumference of the rim of the larger, though in other respects detached from it, and revolving on its own axis, situated either exactly in a perpendicular line under the centre of the axis of the larger wheels, or forward or back of the centre, and are by their axles attached to the body of the carriage or vehicle, and may be secured for permanency by straps to the axles of the larger wheels above them. The rims of the large wheels are made so wide that the rim of the smaller, with the concave in its greatest circumference or periphery, may run clear of the spokes or support of the centre of the larger, and on its inner convex side.

"The large wheels must have as little play on their axis as practicable, in order to keep them steady; but the axis may be so attached to the body of the vehicle as to allow the body to rise whenever any obstable intervenes between the outer periphery of the smaller and inner periphery or circumference of the large wheel; the large wheel to run on the ground as a detached wheel, whilst the lesser wheel moves on the inner side of the large wheel's wide rim. The action of these wheels, thus applied to any vehicle, will be that of one wheel running on the inner circumference of the rim of the other, rendering the moving of any heavy body much easier than in the common

method, and being capable of surmounting any obstable which may intervene to prevent the movement or progress of a carriage, with less physical or mechanical power, than in any other method heretofore known or used. I, the said Augustus Whiting Gillet, on behalf of George Bridgman, therefore claim the exclusive right of constructing and applying wheels, agreeably to the foregoing description, as well as the peculiar manner of their action on each other in expediting the movement of any carriage or heavy body over rough, or even smooth surfaces."—[*Inrolled in the Rolls Chapel Office. June,* 1829.]

Specification drawn by Mr. Newton.

To Thomas Westwood, *of Princes Street, Leicester Square, in the county of Middlesex, Watchmaker, for his invention of certain improvements in watches and time-keepers.*—[Sealed the 23rd of September, 1829.]

This invention is what may be called an eight-day watch, it only requiring to be wound up once in a week, the maintaining power being sufficient to drive the works so long a time. The general construction of the watch has no particular feature of novelty, excepting that its barrel and spring must be larger than usual, and an additional wheel introduced to connect the movements. The invention is thus described by the Patentee:—

SPECIFICATION

"As the individual parts composing a watch movement, are already well known and in use, I shall only describe the manner in which they are arranged and combined in my patent watches and time-keepers, which is as follows:—The frame consists of two circular plates, united by pillars in the usual manner. Plate XII. figs. 9 & 10, represent the pillar plate on which the calliper is drawn.

The circle *a*, represents the barrel; it occupies more than two-thirds of the diameter of the frame, and the usual height between the plates, and is what is usually termed a going barrel, having teeth on its edge, and constituting the first or great wheel. The circles *c*, *d*, and *e*, represent three wheels and pinions, usually denominated in thirty-hour movements, the centre, the third, and the fourth, from which they do not differ as far as regards their uses; and the circle *f*, represents the escapement wheel and pinion. These wheels and pinions are placed under the barrel, that is to say, between it and the dial plate, in cavities formed in the pillar plate, with cocks or bars to receive their pivots; the space between them and the upper plate being occupied by the barrel. The motion is communicated from the barrel to the wheels under it, by means of an intervening wheel and pinion, represented by the circle *b*. The teeth on the edge of the barrel act in the pinion *b*, and the wheel *b*, which is sunk, acts in the centre pinion. By referring to the diagram, fig. 9, it will be seen that the diameter of the wheel *b*, extends from its proper depth in the centre pinion to the edge of the plate; and as it cannot be placed at a greater distance from the centre of the barrel, it therefore limits the size of the barrel; but by introducing an additional wheel to communicate the motion from the wheel *b*, to the centre wheel, there will be room for a barrel of still larger dimensions. Fig. 10, represents a calliper of a movement, with the additional wheel, and a barrel of more than three fourths of the diameter of the frame; the wheel *b*, which is smaller in diameter than in fig. 9, acts in the pinion of the additional wheel, represented by the circle *z*, and the wheel *z*, acts in the teeth of the centre wheel, which has no pinion, only a plain arbor. The additional wheel being under the barrel, is sunk with its pinions, in the same

manner as the centre, third and fourth, before described. The relative velocities of the centre wheel and barrel are the same in both callipers, viz. 64 to 1. The ratios of the intermediate wheels and pinions may be varied without any material consequence. The upper plate receives the pivots of the barrel arbor, and the pinion *b*; both callipers, in the usual manner, and it also bears the jewelled cock in which the balance pivot acts. The points upon which I ground my right of exclusive privilege to the above invention and improvements, under my aforesaid recited patent, are the arrangement of the wheels and pinions, as far as regards their being placed so as to act under the barrel, that is to say, between it and the dial plate, as before described, and shown in the annexed diagrams, thereby admitting within the limits of a pocket watch of the usual size, a maintaining power of sufficient strength, with one winding up, to keep up a vigorous motion in the balance for the space of eight days, or for a longer period if required.

To William Tutin Haycraft, *of the Circus, Greenwich, in the county of Kent, Doctor of Medicine, for his invention of certain improvements in steam engines.*—[Sealed June the 11th. 1830.]

This invention is for improvements in steam engines, by which very high, or which is commonly called surcharged steam, may be used without the risk of doing that injury to the piston packings, &c. which is done in engines of the common construction. The following is the

SPECIFICATION.

"These improvements are applicable to steam engines, of both high and low pressure, and also to that

combination of both, commonly called Wolff's engine, they are intended chiefly for the purpose of using that quality of steam, which is commonly known by the name of surcharged steam. I have discovered by repeated experiments, that if the ordinary steam of water be inclosed in or suffered to pass through a vessel, which is heated to a temperature of 100° Faht. higher than that at which the steam was generated, it undergoes an increase of volume about tenfold, and that this augmentation of temperature is effected by a relatively small expenditure of fuel (as may be easily understood by those who are acquainted with the known doctrines of specific heat). I have also discovered that this rarified, or as it is commonly called, surcharged steam, if it be introduced into a working cylinder of a steam engine properly constructed, will, if the said cylinder be heated to a temperature equal to that of the surcharged steam, produce mechanical power greater than that of ordinary steam, and equal to the increase of volume it has undergone, namely, tenfold, whereby a great economy of fuel is effected. This surcharged steam has been heretofore attempted to be used in steam engines, but without success; because, from its temperature and its disposition to absorb moisture, it dries or otherwise injures the packings and lubricating substances used for the pistons and joints, and from its extreme rarity it easily escapes through ordinary joints. It is, then, chiefly for the purpose of using this surcharged or rarified steam, that my improvements are designed.

"Another intention of my improvement is to enable me to use steam of a very high pressure, whether of the ordinary or surcharged steam; and is also intended to prevent the condensation of steam within the cylinder, whether of high or low pressure; which condensation, by

the subsequent evaporation, occasions an abstraction of heat, and a consequent waste of steam. My first improvement is designed for the purpose of preventing the escape of steam at the packing of the piston and piston rod, represented in the accompanying drawing at Plate XII, fig. 1, which is a sectional view of a working cylinder piston and piston rod, with the boiler and the water pipe; *a, a, a, a,* represents the cylinder; *b,* the piston; *c, c,* is the piston rod which passes out at the bottom of the cylinder, and is at its lower extremity intended to be connected with the beam, crank, and other machinery of the engine, in the ordinary way; *d, d,* is the stuffing box, by which the piston rod is made tight; *e, e,* is a water tube opening into the lower part of the boiler *f,* which, as represented, should be placed higher than the cylinder; *g,* is a branch pipe, by which the working steam is inducted and educted by suitable valves, not represented in the drawing.

"The explanation of the action of this arrangement is as follows:—If we suppose that there be steam in the boiler *f,* it will produce a pressure on the surface of the water, which pressure is communicated through the water pipe *e, e,* to the cylinder, and there acts against the under side of the piston *b.* The piston rod *c, c,* it will be observed, is of unusual thickness; the transverse sectional area of the rod should be about one-half of the area of the piston; the intention of which is, that the pressure exerted by the column of water against the piston may be diminished one-half. If in this state of things the steam be admitted by the branch *g,* to the upper part of the cylinder, it will produce a pressure on the upper side of the piston, equal to the whole area of the piston *b*; and this pressure will be twice as great as that on the under side of the piston communicated by the column of water, because the steam acts upon twice the area, the

piston will accordingly descend, displacing the column of water below it, but with a power equal only to half the pressure of the steam on the upper side; when the piston has performed its downward stroke, and the working steam is let off through the branch *g*, the pressure on the underside of the piston through the column of water, which I call the re-acting pressure, will now cause the piston to move upwards with a power equal to that with which it descended; and so on as long as the engine remains at work. Should it be inconvenient to place the boiler at a greater altitude than the cylinder, a modification of the arrangement may be made as represented in fig. 2, which is an elevation of the working cylinder *a*, as figure 1, excepting that the pipe *e*, instead of leading directly into the boiler, communicates with the vessel *h*, *h*, which I call the water cylinder. This cylinder is supplied with the water in the way hereafter to be described. The surface of the water in the cylinder *h*, should be higher than the top of the working cylinder *a*, *a*, *a*, *a*, viz. about the height represented by the dotted line. By means of the branch pipe *i*, steam from a boiler situate at any convenient distance, is introduced into the water cylinder *h*, when its pressure will produce the same reaching effect on the piston as has been explained in reference to fig. 1. In order to charge the cylinder *h*, with hot water, the pipe *k*, is carried to the bottom of the boiler, and the cock *l*, being open, and a valve in the steam pipe *i*, closed, the pressure of the steam in the boiler will force the hot water up the pipe *k*, till the vessel *h*, is nearly full. The cock *l*, being now closed, the steam is to be let on into the cylinder *h*, at the pipe *i*, in order to bring the water to its proper level, which is done by its passing down the waste pipe *m*, as shown by dots, and thence again into the boiler. To

ensure a continued supply of water in the cylinder *h*, a pump (not represented) may be applied at *n*, to be worked by the engine which feeds both it and the boiler, the superfluous water flowing into the latter by the pipe *m*.

"In the improvement thus described, it is evident that no steam can escape past the packings of the piston or its rod without first displacing the water; this it cannot do, because the usual packings and joints, although permeable to steam, are sufficiently tight to resist the passage of water even under great pressure; also the working steam, however great its pressure, cannot pass by the packing of the piston *b*, because there is an equally reacting pressure on the other side; and surcharged steam cannot injure the packings, because of the constant pressure of water.

"The only parts of this contrivance to which I claim an exclusive right, is the intervention of a column of water between the piston, and the steam of the boiler, while the working steam (whether of high or low pressure, or surcharged steam) is inducted to and educted from the working cylinder at the other side of the piston.

"My second improvement is a combination of my first already described, with an addition now to be explained, and is intended more especially for the purpose of working with surcharged steam. Fig. 3, is a side-view partly in section, representing the same as fig. 2, or the contrivance may be the same as in fig. 1, with the additions shown at fig. 4, viz.: To the piston *b*, is attached a solid plunger *p*, which is made to fit the interior of the cylinder *a, a, a, a*, and move up and down freely within it. The plunger is in length about the stroke of the engine or more, and the cylinder *a, a, a, a*, is made about twice the length of the stroke or more, or so long that the piston *b*, with its prolongation or plunger *p*, shall be able to move within the

cylinder as far as may be required for the stroke of the engine.

"The intention of this arrangement is, that the surcharged steam inducted by the branch pipe *g*, into the cylinder, above the plunger *p*, shall not enter into that part of the cylinder which is occupied with the water below the piston *b*, that the steam may not be cooled thereby, and another intention is, that the water on the lower side of the piston shall not, during the action of the engine, enter into the upper part of the cylinder, so as to cause any condensation of the steam.

"I also apply heat to the cylinder by means of fire inclosed in the brickwork *q*, *q*, taking care to surround the cylinder with fire-clay, or some other substance, to preserve it from injury, or the same object may be effected by any other convenient heating means.

"In this improvement, I claim the interposition of water between one side of the piston and the steam in the boiler, as described, together with the increased length of the cylinder and piston.

"The third improvement is simply a modification of the last, and is represented in fig. 5, which is a side sectional view, and is intended more especially for a condensing engine, and to be used with surcharged steam; *a*, *a*, *a*, *a*, is the cylinder; *b*, the piston; *c*, the piston rod: *d*, *d*, the stuffing box; *e*, *e*, is the branch and pipe opening a communication between the upper end of the cylinder and the boiler; *f*, is the boiler; *z*, is the pipe leading into the surcharging vessel, *s*. The pipe *e*, *e*, is furnished with a valve *j*, by which the pressure of the steam on the piston may be regulated: *g*, is the pipe through which the surcharged steam passes, having been rarified in the vessel *s*: *p*, is the plunger as before described: *t*, is a branch pipe communicating within the cyilnder above the piston. At

the outward extremity of which pipe is to be attached the delivering pipe of a small forcing pump, not represented; which pump, during the action of the engine, continually forces water to the upper side of the piston. There is also another branch pipe *u*, communicating in the same way to the upper part of the cylinder, to the outward end of which is attached the feed pipe of another small forcing pipe, (not represented) by which the superfluous water is drawn from the cylinder and forced into the boiler or elsewhere. The intention of these two pumps is to cause a short column of water to be interposed between the piston and the re-acting steam from the boiler, which column of water will produce the same effects as described in the foregoing improvements.

"I also apply heat to the lower part of the cylinder, by means of a fire contained in the brickwork at *v*, *v*, taking care to defend the cylinder from the action of the fire; or I heat the working cylinder by any other convenient means.

"In this improvement I do not confine myself to any particular mode of keeping up the column of water interposed between the re-acting steam in the boiler and the piston, but as in the previously described, I claim the introduction of a column of water on one side of the piston, the working steam acting on the other side; together with the use of the plunger *p*.

"My fourth improvement applies to ordinary condensing engines, and consists of the following combinations of parts, none of which I claim separately:—First,—In addition to the ordinary boiler for supplying the working steam, I employ another boiler, which may be much smaller, and capable of sustaining the resistance of high pressure steam. Secondly,—In the adaptation of a pipe proceeding from this high pressure boiler, which communicates with an outer cylinder or jacket, surrounding or

enclosing the working cylinder in the usual way, and also another pipe issuing from this jacket, through which the high pressure steam may escape to the other boiler, from under a valve loaded to about 20 pounds on the square inch less or more. By this arrangement there is a constant circulation of high pressure steam round the working cylinder. Thirdly,—The low pressure steam is supplied by a pipe from the low pressure boiler, provided with the proper valves. Fourthly,—Both the piston and the piston rod must be provided with metallic plates, commonly called metallic packing, instead of the usual hemp packings; but I do not confine myself to any precise form of pistons, as any form that fits sufficiently accurate will answer the purpose.

"In this last improvement it is the combination only of the above recited four particulars that I claim as new, all of which combined together, and not a part or parts of the four, I have found to be essential in effecting my objects. In these my aforesaid improvements, where I speak of the re-acting steam operating through the medium of water on the piston, I do not mean to exclude any other agent capable of reaching in the same way, if such agent could be substituted for the steam in the boiler with good effect; such for instance as air or gas, confined in a suitable vessel, so as to produce the said re-action. Also the said re-action may be effected by a high column of water; and in steam engines of a moderate pressure, and in condensing engines, it may be convenient to effect the re-action by means of the pressure of the atmosphere, taking care in all these cases there shall be interposed between the piston and the re-acting agent a (sufficient) quantity of water, which water in every case where my improvements are used (with the exception of my fourth improvement) is essential in

fulfilling my intention. It is also to be understood, that where these my said improvements are applied, either to condensing or other steam engines, all those parts are to be added which belong to such construction of engines in the ordinary way. Although I prefer that the packing of the piston and piston rod should be of hemp or similar material, (except in my fourth improvement) I do not exclude the use of metallic packing; and although I do not claim any peculiar mode of sucharging the steam used in my improvements, yet I prefer the two following means combined together, viz.: I cause the feed-steam from the boiler to pass through a tube or tubes, or vessels heated by means of a fire, before it enters into the working cylinder; and secondly, by heating the steam and the working cylinder by means of a fire, or by any convenient means of heating. It is also proper to state, that as surcharged steam, owing to its high temperature, will injure and destroy the usual cements, and packings applied to the junctions of the parts of engines, it is convenient to form such junctions by hemispherical joints, by grinding the two metallic surfaces together, which I recommend to adopt in all the joints which require packing.

"The positions of the cylinders are immaterial in the employment of my improvements, except in that described under the third head, it being only necessary to observe that the boiler or water cylinder is so placed that the surface of the water therein shall be higher than the upper part of the working cylinder."—[*Inrolled in the Rolls Chapel Office, Dec.* 11*th* 1830.]

Specification drawn by the Patentee.

Novel Inventions.

The inventions of Mr. A. Smith, engineer, of Princes Street, have often come under our notice, and it is with pleasure we lay the following description of his improved door springs before our readers. The common door spring has many disadvantages besides its unsightly appearance; it being weakest when it is wanted to be most powerful. These improved springs are fixed on the top or bottom of the door, and are morticed into it, so that the spring is hid from view, and are much more powerful than the common ones.

In Plate XI. figs. 7 and 8, are sections of part of a door and its lintel, the door opening only one way; fig. 9 and 10, are like sections of a door opening both ways. The heliacal spring *a, a,* is contained within the casing *b, b*; this casing is morticed into the top of the door, *c, c,* so as to be flush with the top edge, and is firmly fastened with screws; on the underside of the lintel of the door frame *d, d,* is fixed the piece *e,* to this piece *e,* the connecting piece *f,* is attached by a pin joint; this piece *f,* is also connected at its reverse end to another piece *g,* within the casing; the end of this piece, is bent so as to press against the end of the spring, *a, a,* see fig. 7. On the upper side of the casing, is a long slot for the connecting joint, between the pieces *f,* and *g,* to slide in as the door opens. It will be seen in fig. 8, that as the door is opened, the connecting piece, *f,* fixed at one end, to the lintel of the door frame, will cause the spring to be compressed, and when the door is let go, the spring extending itself, will cause the door to shut; figs. 9 and 10, are views of a spring of the same con-

struction, for a door opening both ways; the connecting piece *f*, in this instance, is extended at its end, and has two pins, *i*, *i*, fixed upon it; these pins, when the door is opened either way, come in contact with the notches in the piece *k*, as shown in fig. 10, and cause the spring to be depressed as before described. It will be seen, that the piece *k*, also serves as part of the hinge of the door.

Mr. A. Smith's Patent Paddles.

These patent paddles having engaged the attention of several scientific gentlemen for a short time past, we hasten to lay before our readers, an account of an experiment, tried upon the River Thames, at which we were present, on Thursday, January 27th, which completely realized the expectation of the inventor and the gentlemen present. The experimental paddles were fixed between two fine eight oared cutters, belonging to Messrs. Rawlinson and Lyon, of Stangate, each 45 feet long and 4 feet 6 inches wide; the space occupied by the paddles between the cutters was 3 feet, making the whole 12 feet wide: in the boats were fourteen persons, besides the weight of the paddles, machinery, and casing, which weighed about eight hundered weight. There were eight men turning at the winches, which work the machinery, although from the positions in which they were obliged to stand, and from their not being used to turn winch handles, their power did not amount to six effective men; but under every disadvantage of a rough stormy day, the boats were propelled from Westminster Bridge to Waterloo Bridge, a distance we believe of about five furlongs, in two minutes and 45 seconds; the tide was just at flood, the experiment being tried at half past one o'clock, time of high water, with a strong side-

wind rather adverse. After this the boats proceeded up the river to Battersea, against a rapid tide and strong wind, at an astonishing rate, and returned to Stangate. This proved to be one of the most complete experiments yet made on the river, and from what we saw of the effect of the paddles, they bid fair to give that facility to inland navigation, so much wanted. There is but very little surge from the motion of the paddles, and that in a direct line with the way of the boats, and not against the sides as in paddles of common construction, thus preventing the injury to the banks of canals, which has hitherto prevented the introduction of steam into inland navigation.

Original Communications.

Art. IV.—On Power Levers and Perpetual Motions.

To the Editors of the London Journal of Arts, &c.

Gentlemen,—You justly repudiate in your editorial strictures the numerous attempts of speculative uninformed machinists to impose upon the public, their abortive pretensions to the production, or rather to the generation of mechanical power, by any combination of levers or train of machinery contrary to the fixed laws of nature, as determined by universal experience.

Whatever is gained in relative power by such combinations is reciprocally proportionate to the loss of time, or the space passed through by the moving power—to say nothing of the increased friction beyond that of the simple lever or pulley, inherent to all compound machines. Although mechanical forces cannot be generated contrary to the above universal axiom—

yet there are several natural forces or principles of which we may avail ourselves, for the production of mechanical power. I do not advert at present to the effects of heat and electricity, but to the natural forces known under the names of attraction, repulsion, and gravitation. These are directly applicable to the production of mechanical power, and have been repeatedly applied with success in the construction of machines.

Some years ago I examined in the Palace of the Thuillieries, at Paris, a curious and most ingenious piece of machanism, the moving power of which was magenetism. It was a beautiful time-piece in one of the salons, the maintaining power of which was produced by two powerful magnets, whose positive and negative poles acted by alternate attraction and repulsion upon the pendulum, and caused its vibrating motion. This clock had been kept in motion, as far as I could learn, for several years, and excepting for the gradual wear of the train, may continue to this time.

Here then is a sort of perpetual motion exhibited in an actual working machine. The doctrine of perpetual motion may be accepted in a philosophical sense, but not in the common application of the term.* The reciprocal attraction of gravitation in our planets, keeps them in their respective spheres, and effects their uniformly accelerated and retarded motions. They have, with the whole solar and planetary system of the universe, performed their unceasing evolutions for ages; and, without a new volition of the Deity, they will upon geometric principles perform the same determined motions to all eternity. The retrocession of the equinoxes is a perpetual motion of this species.

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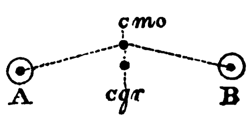
* *All motion is in its nature perpetual;* for it may be proved upon geometrical principles, that the total amount of forces required to destroy any given motion is precisely equal to the original impetus or moving power. The motion of a body once impinged—can no more be destroyed without an adequate power than could such motion have been given without an adequate power.

It is under this head of power, viz. the attraction of gravitation, that I should place the force generated, or rather exhibited, in Nicholls' power lever, (for Specification see Vol. IV. page 35, Second Series, and also Mr. Rayner's Communication.) A force applicable to mechanical purposes, is undoubtedly gained by the construction of his machine; a reference to the principles of statics will shew in what manner it is gained. I will endeavour to elucidate the subject upon these principles.

Gravitation is a property or quality decreasing as the squares of the distances from the centre increase; this is an axiom universally allowed: the forces of the attraction of gravitation are therefore reciprocally as the squares of the distances. At equal distances from the same centre of attraction, the force is proportional to the quantity of matter in the body attracted; therefore, in all cases, the force of attraction is as the quantity of matter directly, and the square of the distance reciprocally. The attraction of gravitation is strongest at the surface of the earth, below the surface, it decreases with the distance; *and above the surface, it decreases as the squares of the distances increase.* It is to this latter modification of gravitation, that we refer the generation of power in Nicholls' power-lever or rather pendulum. *This machine is a bent lever,* having, *when at rest,* the centre of motion above the common centre of gravity—thus,

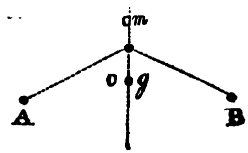
For the purpose of explanation, we must consider the weight and magnitude of each disk and its arm of this bent lever as equal; and that the total weight is thrown into the centre of gravity of the disk;



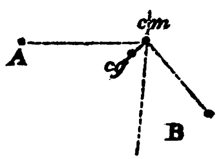
these postulata may be granted for a practical demonstration, although not strictly true.

Thus, the whole weight of each arm will be represented by its respective centre of gravity; viz. by the centre of magnitude of each circular disk; the diagram will then be thus—

The line of direction of A, tends to the point of the earth's surface immediately under it, and the line of B, to a similar point under B; for the line of direction in a heavy body is that in which it endeavours to descend; *the distance of a power* is a line drawn perpendicularly from the fixed point of any engine or lever upon the line of direction.



The distances of A, and B, as distinct weights or powers, are equal by the postulatum, when the machine is at rest. When the machine is brought by some extraneous power into this position, the distance of A, is increased, for that arm of the lever becomes perpendicular to its line of direction, in which position it has the greatest absolute and relative force. At the same time, the distance of B, is equally lessened in equal times; and its line of direction approximates to a parallel line drawn perpendicularly through the centre of motion; and consequently the absolute and relative force of B, is proportionately lessened.



The moving and sustaining power at B, is now withdrawn, and the common centre of gravity, *c g*, which has been raised towards A, descends. But A, has had an accumulated power thrown into it by its distance from the centre of motion, having been increased as in the last figure. Upon the removal of the sustaining power, A is to be considered as a suspended weight, which would fall perpendicularly with a momentum of increased velocity proportioned to the space it would pass through, *i. e.* in a ratio compounded of the quantity of matter in A, and the square of the distanee from the surface of the earth, if A, should be detached from the lever in this new situation. Now, it has been found by experience, that the momentum, which a heavy body acquires in freely falling to the earth, doubles its actual force every 16 feet through which it falls, near the surface.

Thus suppose the time that a heavy body, weighing 100 lbs. takes in falling freely from the height of 64 feet, be divided into four moments or measures, the momentum or ratio of increased velocity will stand thus—

1. 2. 3. 4. moments,

1. 4. 9. 16. velocities,

3. 5. 7.

1. 3. 5., arithmetical increase of momentum at each measure, being the difference of the squares of the moments. This may be proved geometrically by 6th *Euclid, pro.* 4.

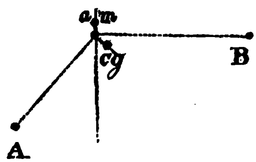
And the actual force of 100 lbs. freely falling, the 64 feet divided into 4 moments will be 200 lbs. at the end of the first 16 feet, 400 lbs. at the end of the second 16 feet, 800 lbs. at the end of the third 16 feet, and 1600 lbs. at the end of the fourth 16 feet, viz. at the surface of the ground. It is this principle of increased momentum, and consequently of force which is brought into action in pile-driving—a process that could scarcely be effected by any application of a dead weight,

In Nicholls' power-lever, the momentum of A, in descent is diminished first by the vibration of its lever, which continually moves the line of direction, and consequently the distance of A, nearer to the perpendicular let fall from the centre of motion; and, secondly, by the counterbalance of B, which, upon and during the descent of A, continually moves its line of direction and distance farther from the same perpendicular, and consequently in rising, the centre of gravity in B, is in equal time, exerting a progressive increasing power as a check to the momentum which A, would otherwise obtain in its descent. I say nothing of the resistance of the air, because, by the postulatum, the weight and magnitude of each disk and its arm are equal to the opposite, and as an elastic fluid presses equally in all directions, and the velocities of A, and B, are always equal in equal times, the resistance of the elastic medium is equal.

Now, in Nicholls' lever, and in every similar pendulum in which the centre of motion is above the common centre of

gravity, the momentum of the raised arm in the act of falling must necessarily overcome the resistance from the vibration of the descending lever, and from the weight of the ascending lever and disk. This may be proved by *props.* 5 *and* 6, *&c.* lib. 1, *Cursus Mats. Ozanam,* but the demonstrations are too long for insertion.

The disk A, therefore carries the opposite lever and disk B, to such height as determines the reciprocal equality of the forces, and the machine takes this following position :—



or a similar position, proportioned to the original impulse given by the moving power.

The same principles then operate in the descent of B, aided by a fresh application of the moving power. The alternate elevation and depression of the disks are thus continued by a proportionate small moving force; *and there is necessarily a generation, or rather a development of mechanical power, exhibited by this construction of a pendulum lever, which is applicable as a prime mover to a train of machinery.*

I trust this elucidation of the subject may prove useful, and answer the wishes of your correspondent, who appears interested in the question—whether or not a real efficient mechanical power applicable to useful purposes be gained by this lever pendulum?

It may be permitted me again to apply a remark I made upon M. Bernhard's vacuum machine. The principles of science founded upon the undeviating laws of nature, are fixed and certain; if facts do not immediately appear consonant to those principles, it is only because we have not sufficiently applied them to the investigation of the phenomena presented by any

particular modification of action. The demonstrations of geometry must still be applied to every thing connected with mechanical agencies, or we have no certain guides which can save us from the error of making hypothesis supply the place of correct reasoning, and sound deduction.

I am, Gentlemen, your's, &c.

ÆOLUS.

Art. V.—On the Employment of Machinery.

To the Editors of the London Journal of Arts.

Gentlemen,—An error of the most mischievous tendency having been extensively circulated, that machinery tends to deprive the poor of labour, and as this error appears to me to arise from taking a very narrow and superficial view of the question, from looking only at partial effects and not at general results, by not considering that the comparatively few hands which may be thrown out of employment, by the introduction of machinery in any particular branch, are more than taken up by the increased demand and general extension of our commerce, occasioned by such improvement in the productive means, I am induced in hopes of correcting the prejudicial effects of such an idea, to offer the following considerations;—It may be truly affirmed, that perhaps with the exception of the last few preceding years, more hands are employed at the present time, although a period of peculiar depression and distress, than at any other period in our history. It must be quite clear to every reflecting mind, and particularly to those who are at all acquainted with public economy, that we owe the perfection and cheapness of our various fabrications to the power of machinery, in its improved and widely extended

use; and that it is this cheapness and this very perfection which originates the demand. It is the love of exchange, the desire of novelty, which gives rise to every effort of industry. It is this power of invention, which so pre-eminently distinguishes our species, at once stimulates and excites our wishes, gratifies our tastes, and perfects the condition of our nature.

Instead of looking at the power of invention—this inestimable gift, this beautiful and distinguishing characteristic of man's reasoning mind, as an evil in its use; should we not rather attribute to it all that awakens the faculties, gives birth to industry, emulates exertion, and adorns the circle of cultivated life? Who will dare argue that like the brute we should merely eat, drink, and having satisfied the immediate demand of nature, lie down to sleep; yet such would be our lamentable condition if the enemies of invention, and improvement, could effect their enslaving purpose; say to this most divine fuculty of the human mind, (the spirit and power of invention) here shalt thou stop, retard its progress by taxation, deaden its energies by restrictions, and instantly that pre-eminence in arts and manufactures, which we mainly owe to the protection and liberality of our government, and which has lifted England to her present exalted and unrivalled state, which makes her the envy and admiration of the world, and enables her to throw such preponderancy of weight in the scale of empire, will, as if touched by the withering hand of destruction, fall at once into irremediable decay and the confusion of disordered ruin. The bare supposition of such impolitic measures are absolute affronts to the wisdom and experience of any government, even the most weak and incapable, and appear on their open face to convey to the most careless eye absurdities, such as no reasonable man can fall into; it is therefore in vain to argue on them and the ruinous consequences of restrictive steps, merely for the idle perusal of those whose tempers are too volatile to inquire into and examine things for themselves; or have understandings inadequate to comprehend that which is plain and evident to almost every inferior capacity.

In the present condition of our nation it is utterly impossible to stand still—the vast continent of America pushing us on the one side, and the whole civilized continent of Europe on the other, it is no longer become a matter of choice; advance we must, and that rapidly, or by beginning to recede, though perhaps gradually and imperceptibly at first, we shall helplessly descend from the pinnacle of glory and commercial fame, to a state of insignificant nothingness, and be compelled quietly to endure from those very foreign powers which we have partly instructed, rivalled, and excelled, the pitiless taunts and reproaches so lavishly bestowed on the wreck of fallen grandeur,

Is it not then undoubtedly the duty and only line of conduct which ought to be adopted by our legislature, to remove every restriction which presses unfairly upon a majority of the population—nay, I may say the community at large, and yield the industrious persevering as easy an access and as smooth a path as possible, to success of manufacture and acquirement of wealth; and there is none more worthy of their consideration, as calculated to administer the most efficient relief under their present depressions, than the existing prejudicial and abominably mischievous corn law ; likewise to curtail every unnecessary expenditure, and reduce our curbing taxation to the lowest possible degree. Sweep away all kinds of restrictions, and afford sufficient protection to commerce, and the means resorted to for extending it in every branch; then see how improvement and invention will flourish and succeed, and by bettering the condition of the people, make them happy and comfortable. In such a state of things the facility of production would render all our articles necessary for consumption proportionably cheap, and from the increased demand in quantity, a man would obtain sufficient reward for his inventive genius, and stimulate his talents to embrace (cheerfully) greater exertion and labour.

Thus, then, it would be palpably ridiculous to repress and check this spirit of advancement (the very means by which we

have ascended to the height of splendour we now enjoy) by forbidding laws, even though expressive of the intention of a prohibitory system in the very mildest form; if almost amounting to nothing in themselves, it is the effect they are likely to produce generally that we must contemplate and dread. Our prosperity of the present crisis hangs, as it were, upon a single thread, which once snapped by the impetuous and arbitrary hand of an ignorant legislating power, will hurl us back into the mazes of former darkness, and envelope our rebuting and beclouded faculties in the mist and gloom of semi-barbarous anarchy, henceforth to be aroused only to those riotous starts of restlessness, preceding the legarthic slumber of spirit broken apathy. A moderate willingness on the part of influential authority, to render every facility and encouragement in the reach to the inventive talent of the country, will happily avert such a disastrous train of circumstances, and by countenancing our best endeavours towards progressive perfection in machinery and manufacture, will enable us still to survey the rivalrous attempts of surrounding nations with the calm eye of triumphant superiority. Only suffer the enterprizing knowledge of mechanical genius to rest upon its own basis, and man will voluntarily stretch his expanding faculties on the rack of invention, to an indefinable and illimitable extent; one improvement will suggest and bring forward another, while each tending to diminish the expense of production, will enable us to throw our manufactured articles into foreign markets at such a rate of reduced prices, as not only to compete with, but eminently surpass the world.

By imposing duties and levying of taxes on machinery, this indispensable means and sole prop of our commercial splendour and importance, we shall cut up manufacture by the roots, and produce an effect diametrically opposite to the one above mentioned so absolutely necessary to our present welfare and future prosperity. That long and vainly hoped for possibility of underselling other powers in foreign markets being already sufficiently distant from the heavy pressure of a burdensome taxation, without

increasing such, particularly in this most essential point, or throwing frivolous but destructive obstacles in the way of improvement, it is a duty incumbent on all, both individually and as a nation, to resist every effort made to oppose its progress, or limit and curb its career.

Let the narrow minded bigots of restriction calmly and rationally consider the inevitably ruinous consequences of their madness and folly, in striking a death blow to this rapid march of invention, and not even their brazen hardihood, arising from the power and influence of ill-bestowed wealth, shall dare to contemplate the disasters and destruction which must ensue. By following their nefarious schemes, an overgrown and impoverished population would be instantly deprived of employment, without the bare possibility of subsistence, and such calamitous scenes of universal misery (which no person possessed of common fellow feeling can remotely think on without the utmost chilling horror) would start forth into a dreadful existence, no longer to be slighted and contemned as the picture of imaginary grievance, but a terrific and awful reality.

From reading your very judicious remarks on the employment of machinery, in the Journal of Arts for the present month, and considering it the duty of every Englishman to stem the torrent of error, which appears so widely spread amongst the thoughtless and illiterate, and to lend a willing assistance to refute misconceived opinions, I am induced to offer these remarks upon the improved art of manufacture in our country, and the necessity of continued improvement. Should they meet with your approbation, I propose to myself the pleasure of renewing the correspondence at some future day.

Gentlemen, I remain yours, &c, &c.

Stroudwater, Jan. 12. H. C. Harris.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[*British Law of Patents for Inventions.*]

(continued from p. 234.)

All merchants may buy and sell, within the realm, without any disturbance.—1378. 2 Ric. II. s. 1. c. 1.

Merchant strangers may come into, continue in, and depart forth out of the realm.—1382. 5 Ric. II. s. 2. c. 1.

All merchants, aliens and denizens, may buy and sell within this realm, without any interruption, according to the 9th Edw. III. and 25th Edw. III.—1387. 11 Ric. II. c. 7.

Neither letters of the Signet, nor of the King's Privy Seal, shall from henceforth be sent in damage of the realm, nor in disturbance of the law.—1387. 11 Ric. II. c. 10.

In a petition to the King for grants of lands, offices, &c. the value shall be expressed. All they that do demand of the king grants of lands, offices, rents or any other profits, shall make express mention in their petitions, of the value of the thing so demanded, and also of that which they have had of the King's gift (or of his predecessors) before; and unless that is truly done, and duly proved, the King's Letters Patent thereof made (on such defective petitions) shall not be of any force, but shall be annulled, to the punishment of them which have so done deceit to the King.——1399. 1 Henry IV. c. 6. explained by 1400. 2 Hen. IV. c. 2. exp. limited by 1404. 6 Hen. IV. c. 2, exp.

Assise maintainable by the disseise, against the King's patentee of lands. In case any lands or tenements be granted

by the King's patent, without title being found by inquest or otherwise, where the King's entry is not given by law, they that be put out, or disseised of their freehold, shall have a special assise of the Chancellor's grant, without other suit being made to the King in that behalf. And in case that they which be put out or disseised, do recover against the persons having such patents, they shall recover their treble damages.—1399. 1 Henry IV. c. 8. regulated by 1429. 8 Henry VI. c. 16.

The King will grant no lands, &c. but to such persons as shall deserve them. The King will abstain from making any grants, except to those persons who deserve them, as the same shall appear to the King and his Council; others who make demands for undue grants, shall be punished by the King, with advice of his Council, and such grants shall be void.—1402. 4 Hen. IV. c. 4.

Letters Patent shall bear the date of the delivery of the King's warrant into the Chancery. Every warrant for Letters Patent hereafter sent by the King to the Chancellor, the day of the delivery of the same to the Chancellor, shall be entered of record in the Chancery; and the Chancellor shall cause Letters Patents to be made upon the same warrant, bearing date the day of the said delivery in the Chancery, and not before in anywise. And if any Letters Patents be henceforth antedated, or made to the contrary of this Act, they shall be void.—1439. 18 Hen. VI, c. 1.

An Act for bringing in a fresh stream of running water to the north parts of London. This was the origin of the New River Waterwork. From the novelty of the undertaking, it was at that time considered as an invention. An explanatory Act was passed, 1606, 4 Jas. I. c. 12. It was to have been executed by the city of London, but they transferred their powers to Hugh Middleton in 1608, who completed the New River, and opened it Michaelmas-day 1613, and was created a baronet. He was ruined by the expence; but the property has since been very valuable to his descendants, as well as a great advantage to the metropolis.

An Act to enable all his Majesty's loving subjects of England and Wales, to trade freely into the dominions of Spain, Portugal and France. Notwithstanding a charter of incorporation, recently granted by the King, for a company to trade to Spain and Portugal, and excluding all others in England. Rapin, in his History of England, says, the English not being well skilled in the art of dressing and dyeing their own woollen cloths, had been accustomed to send them in a white state into Holland, where they were dyed, dressed, and part sent back to England for use. The merchant adventurers had a royal charter

from Queen Elizabeth, for transporting white undressed cloths, notwithstanding the statute 14 & 15 Henry VIII. Alderman Cockaine obtained a patent from James the First, for dressing and dyeing such cloths: and the King revoked the merchant adventurers' charter, in order that all cloths might be dyed and dressed at home; but the Dutch then prohibited the importation of dyed cloth from England, and thus shut up a great market; also the patentee did the work badly, and at a great cost; whereby the woollen trade was greatly depressed, which occasioned such clamour, that the King was obliged to permit the exportation of some white cloth, and soon after, the former state of the trade was restored. Charles II. granted a patent for exporting white cloth; it expired in 1707; and then by 6th Anne, c. 8 and 9, the exportation of white cloth was permitted, under a small duty, to encourage the dressing and dyeing trade.—1605. 3 Jas. I. c. 6.

An Act to explain a former Act, made last sessions, 3 Jas. I, c. 6, for free trading. Queen Elizabeth's patent (dated 17 June 1555) to merchant adventurers of Exeter, preserved.—1606. 4 Jas. I. c. 9.

A Patent was granted by King James I. for making Alum in England. Rapin says, the importation of Alum from abroad, was prohibited by proclamation. The manufacture had been introduced into England from abroad, without much success, till about 1600, when Sir Thomas Chaloner discovered a mine in Yorkshire. The art was brought to perfection by Sir John Bourchier. The King took the whole trade into his own hands. —1608.

King James I. granted a number of monopolies, and great complaints were made in Parliament.—1610.

A publication in print, by King James the First, against monopolies (mentioned in the Act 21 Jas.) All grants and monopolies, and of the benefit of any penal laws, or of power to dispense with the law, or to compound for the forfeiture, were declared to be contrary to the King's laws.—1610.

An Act, containing the Censure given in Parliament, against Sir Giles Mompesson, Sir Francis Mitchell, Francis Viscount Saint Albane, Lord Chancellor of England, and Edward Flood. According to Rapin, a patent had been granted by James I. to Mompesson and Mitchel, for the sole making and selling gold and silver lace, which they abused most grossly, making sophisticated lace of copper and base materials, and procuring others (who made good lace) to be fined and imprisoned for infringing their patent. Great complaints were made to Parliament; and in consequence Mitchel was imprisoned, but Mompesson escaped, and a proclamation was issued, offering a reward for his appre-

hension. The King informed the Parliament, that he was ignorant of the abuse of his patent, and would revoke it. The Lords confiscated the estate of Mompesson, who had escaped, and degraded him of his knighthood. Mitchel was also degraded, fined a thousand pounds, carried through the streets of London on a horse, with his face to the tail, and imprisoned for life. The patent for gold and silver lace, and some others, were revoked by royal proclamation.—1621. 18 Jas. I. c. 1. of Private Acts.

An Act concerning monopolies, and dipensations with penal laws, and the forfeitures thereof.—1623. 21 Jas. I. c. 3.

This Act is chiefly declaratory of what had been before held to be law by the judges. In the preamble, mention is made of the King's publication of 1610, but that it had not been enforced.

§ 1. All monopolies, and all grants, charters, and letters patent heretofore made, or hereafter to be made, to any person or persons whatsoever, for the sole buying, selling, making, working, or using of any thing within this realm; or of any other monopolies; or of power or toleration to do (or make warrant for doing) any thing against any law or statute; or to compound for, or grant to others, any penalty limited by any statute, before judgment thereupon had, and all proclamation or warrants any way tending thereto, are altogether contrary to the laws, and shall be utterly void. § 2. All monopolies, and all such grants, charters, letters patent, and proclamations as aforesaid, shall be tried by the common law, and not otherwise. § 3. All persons whatever are now, and shall be hereafter, disabled to use any such monopoly, grants, charters, letters patent, or proclamations as aforesaid. § 4. Any person being hereafter hindered or grieved by pretext of any monopoly, grant, charter, or letters patent as aforesaid, may sue to be relieved, by action in the Courts of King's Bench, Common Pleas or Exchequer, and on judgment, shall recover against them, by whom he has been so hindered or grieved, three times the damage thereby sustained. And any person procuring any such action at law, under this statute, to be stayed or delayed, by colour of any warrant, power or authority, except of the court wherein such action shall be depending, shall incur the pain of the statute of Præmunire, 16th Ric. II. c. 5. § 5. Saving letters patent heretofore granted for a term of 21 years or under, for the sole working of any new manufacture within this realm, which others, at the time of making such grant, did not use. And such of the said grants as were made for more than 21 years, shall become of no force after the expiration of 21 years from the time when they were made.

§ 6. Any declaration before mentioned, shall not extend to any letters patent and grants of privilege, for the term of fourteen years or under, hereafter to be made, of the sole working or making of any manner of new manufacture within this realm, to the true and first inventor and inventors of such manufactures, which others, at the time of making such letters patents and grants, shall not use; so as also they be not contrary to the law, nor mischievous to the state, by raising prices of commodities at home, or hurt of trade, or generally inconvenient. The said fourteen years to be accounted from the date of the date of the first letters patents, or grant of such privilege, hereafter to be made, but that the same shall be of such force as they should be, if this Act had never been made, and of none other.

§ 7. Saving all grants, privileges or authority, made or confirmed by Act of Parliament, so long as such Acts shall continue in force. § 8. Saving all warrants under Privy Seal, made by his Majesty or his successors, to the Justices of the courts of law, or Justices of the peace, giving power to hear and determine offences against any penal statute. § 9. Saving the charter to the city of London, or other borough or town corporate, or to any corporations of any art, trade or mystery, or to any company of merchants erected for the maintenance of any trade.—This exception is the foundation of patents of invention.

§ 10. Saving letters patent concerning printing; digging for and making saltpetre or gunpowder: or casting or making of ordnance, or shot for ordnance Or for any offices. § 11. Saving letters patent for digging and making alum, and for alum mines. § 12. Saving all privileges heretofore enjoyed by the hoastmen of the town of Newcastle-upon-Tyne, for selling, carrying, and shipping any pit coals out of the river Tyne; also concerning the licensing of any taverns. § 13. Saving letters patent for making of glass, granted to Admiral Sir Robert Mansel, dated 22d May, in the 21st Jas. I.; and other letters patent granted to Jas. Maxwell, Esq. concerning the transportation of calve skins, dated 12 June, in the 13th Jas. I. § 14. Saving letters patent granted to Abraham Baker, concerning making smalt, dated 16 Feb. 16th Jas. I.; also letters patent granted to Edward Lord Dudley, concerning the melting of iron ore, and making the same into cast works or bars, with sea coals or pit coals, dated 20 Feb. 19th Jas. I.—This saving for saltpetre and gunpowder annulled by 16 Chas. I. c. 21.

Note.—Lord Dudley's project has in its consequences, proved of immense value to this nation. It was brought into use about 1740.

Note.—There is no provision in this, or any other Act, to oblige a patentee to enrol any description or specification of the invention for which a patent is granted to him.

Note.—Lord Coke, in his explication of the words "generally inconvenient" in § 6, of this statute assumes it to mean, that the new manufacture for which the patent is granted, must not be generally inconvenient, instead of the privilege, which is the obvious sense; he says, "There was a new invention found out heretofore, that bonnets and caps might be thickened in a fulling mill, by which means more might be done, than by the labours of fourscore men who got their livings by it. It was ordained, (by an Act 7 Edw. VI. c. 8.) that bonnets and caps should be thickened and fulled by the strength of men, and not in a fulling mill, for it was holden inconvenient to turn so many labouring men to idleness." If this decision had been followed, it would have set aside every patent for invention.—Institutes, 3d part, c. 85.

An Act to confirm a judgment given in Chancery, for annulling certain Letters Patent granted to Henry Heron, for the sole privilege of salting, drying and packing of fish, within the counties of Devon and Cornwall.—1623. 21 Jas. I. c. 11.

A patent was granted by King Charles I. for making saltpetre and gunpowder; and in 1629, for establishing pawnbrokers in London.—1625.

A patent of extraordinary pretensions, was granted by King Charles I. to David Ramseye, Esq. He was a groom of the privy chamber: the patent was for 14 years, paying a yearly rent of 3*l*. 6*s*. 1*d*. to the King. It consists of nine articles of invention, two of which deserve notice, as indicating the origin of the steam engine; viz. "To raise water from low pitts by fire;" and "To raise water from low places and mynes, and coal pitts, by a new waie never yet in use."

Note.—The raising of water by steam, had been proposed as a philosophical principle, by Solomon de Caus, in a book he wrote in 1615, after he had been in England, in the suite of the Elector Palatine, who married the daughter of James I. Ramseye had probably some notion of carrying that principle into effect. This was many years before the Marquis of Worcester. —1630. See Rymer's Fœdera, vol. 19. p. 239.

Patents were granted by Charles I. for preserving marsh lands from inundation; making soap of English materials; also starch. In 1632, a patent for a diving project; and for a number of extraordinary schemes, which are announced very much

in the same enigmatical style as those which compose the Marquis of Worcester's celebrated Century of Inventions.—1631.

Patents were granted by Charles I. for cleaning of indigo; sedan chairs, printing a price current, soap-making, gardeners, sealing of foreign hops, weighing hay and straw, and marking butter casks. saltpetre, gunpowder, &c. In 1635, for glass-making, raisin wines, gold and silver thread, malt and brewing. In 1637, for cards and dice, maltsters' and brewers' licences, butter casks, pigs and bars of iron, and licensing hackney coachmen, wine casks used by brewers, drying hops and malt with sea coal and turf.—1634.

An Act for the free bringing in of gunpowder and saltpetre from foreign parts; and also for the free making of gunpowder in this realm. A free trade and manufacture allowed in gunpowder, and the materials for making the same, notwithstanding any letters patent for exclusive privileges in such trades; which patents had been saved by clause 10, in the statute of monopolies, 21 James I. and renewed by Charels I.—1640. 16 Chas. I. c. 21.

An Act for encouraging the manufactures of making linnen cloth and tapestry. Any persons whatsoever, natives or foreigners, may freely, and without paying any acknowledgment, exercise the trade of heckling or dressing hemp or flax; also making and whitening thread; also spinning, weaving or bleaching any kind of cloth made of hemp or flax; also making twine or nets for fishing; stoving of cordage; or making tapestry hangings; notwithstanding any law or usage to the contrary. Foreigners setting up such trades during three years in England, to have all the privileges of natural-born subjects, on taking the oaths, &c.—1663. 15 Chas. II. c. 15.

An Act to enable Edward Marquis of Worcester to receive the benefit and profit of a water-commanding engine by him invented. One tenth part of that benefit is appropriated for the benefit of the King's Majesty.—1663. 15 Chas. II. c. 12. of private Acts.

Note.—This has been supposed to be the steam-engine, but from the terms in which the Marquis states it, in his "exact and true definition of the engine," without making any mention of fires, it was most probably a different engine from that which he mentions as "a fire water-work," at No. 68, of his Century of Inventions.

An Act for granting to Sir Philip Howard and Francis Watson, Esq. the sole use of a manufacture, art or invention, for the benefit of shipping. This was a proposal to sheath or cover the bottoms of ships with thin sheet lead, as copper is now used;

it is mentioned in the Philosophical Transactions, Vol. VIII. No. 100, p. 6192.—1670. 22 & 23 Chas. II. c. 7. of private Acts.

An Act for granting a licence to his Highness Prince Rupert, Duke of Cumberland, for one-and-thirty years.—1674. 27 Chas. II. c. 4. of private Acts.

Query, was not this licence relative to some of the mechanical inventions for which Prince Rupert was distinguished. Solomon de Caus was employed in his father's court at Heidelburgh, when the prince was a child, and was probably his preceptor in mechanics.

An Act for the encouraging and better establishing the manufacture of white paper in this kingdom.—1690. 2 W. & M. sess. 1. c. 16. of private Acts.

Query, if this was not relative to the cylinder paper-mill, recently brought from Holland.

(To be continued.)

List of Patents,

GRANTED IN SCOTLAND, SINCE SEPTEMBER, 1830.

FOR an independent safety boat of novel construction. To William Dobree, county of Middlesex.—Sept. 16.

For certain improvements in distillation and evaporation. To William Shand, county of Kincardine.—Sept. 16.

For certain additions to the engines commonly called locomotive engines. To Charles Blacker Vignoles, London, and John Ericsson, county of Middlesex.—Sept. 16.

For an apparatus calculated to prevent or render less frequent the explosion of boilers in generating steam. To Joseph Cochaux, London.—Sept. 16.

For certain improvements in machines or machinery for cutting timber into veneers or other useful forms. To Alexander Craig, Mid-Lothian.—Sept. 17.

For certain improvements in the process of making and purifying sugars. To Marmaduke Robinson, jun. Wstminster.—Sept. 17.

For an improved fid. To Henry George Pearce, Richard Gardner, and Joseph Gardner, Liverpool.—Sept. 22.

For certain improvements in the construction of wheels for carriages to be used on railways. To William Losh, county of Northumberland.—Sept. 22.

For an improvement in the manufacture of painting-brushes and other brushes applicable to various purposes. To Timothy Mason, Middlesex.—Oct. 16.

For an improvement in the preparing or making of certain sugars. To William Augustus Archbold, Middlesex.—Oct. 16,

For certain improvements in the apparatus or machinery used in the processes of brewing and distilling. To Æneas Coffey, Dublin.—Oct. 21.

For an improved method of lighting places with gas. To Michael Donovan, Dublin.—Oct. 21.

For an economical apparatus or machine to be applied in the process of baking for the purpose of saving materials. To Robert Hicks, Middlesex.—Nov. 11.

For certain machinery, and the application thereof to steam engines for the purpose of propelling and drawing carriages on turnpike roads and other roads and railways. To John Heaton, William Heaton, George Heaton, and Reuben Heaton, county of Warwick.—Nov. 23.

For certain improvements in printing machines. To Augustus Applegath, county of Kent.—Nov. 23.

For certain improvements in making or preparing saddle lining, saddle cloth, and girths for keeping saddles in their place on horses or other animals of burden. To Samuel Clarke, county of Devon.—Nov. 23.

For improvements in evaporating fluids applicable to various purposes. To Joseph Gibbs, county of Kent.—Nov. 24.

For certain improvements in machinery or apparatus for printing calicoes and other fabrics. To Mathew Bush, Dumbarton.—Nov. 23.

For certain improvements on locomotive and other carriages or machines applicable to rail and other roads, which improvements or part or parts thereof are also applicable to moving bodies on water, and working other machinery. To Thomas Bramley, county of Surrey.—Nov. 23.

For certain improvements on machines or apparatus for measuring land and other purposes. To James Chesterman, county of York.—Nov. 30.

New Patents Sealed in 1830.

To Daniel Papps, of Stanley End, in the parish of King Stanley, in the county of Gloucester, machine maker, for his having invented certain improvements in machinery for dressing or roughing woollen cloth.—Sealed 23d December, 2 months.

To William Wood, of Summer Hill, in the county of Northumberland, near Newcastle upon Tyne, for his having invented the application of a battering ram to the

purpose of working coal in mines.—23d December, 4 months.

To Marie Elizabeth Antoinette Perlius, late of Rue du Bac, in the city of Paris, in the kingdom of France, spinster, in consequence of a communication made to her by a native of France, for an invention of the fabrication or preparation of a coal fitted for refining and purifying sugar and other matters.—23d December, 6 months.

To John Ferrabee, of the Thrupp Mill and Foundry, in the parish of Stroud, in the county of Gloucester, engineer, for his having invented improvements in the machinery for preparing the pile or face of woollen or other cloths requiring such a process.—23d December, 6 months.

To John Blackwell and Thomas Alcock, both of Claines, in the county of Worcester, machine makers, and lace or bobbin net manufacturers, for their having invented or found out certain improvements in machines or machinery for making lace, commonly called bobbin net.—13th January, 6 months.

To Samuel Seaward, of the Canal Iron Works, in the parish of All Saints, Poplar, in the county of Middlesex, engineer, for his having invented an improvement or improvements in apparatus for economizing steam and for other purposes, and the application thereof to the boilers of steam engines employed on board packet boats and other vessels.—15th January, 6 months.

To William Parker, of Albany Street, Regent's Park, in the county of Middlesex, Gentleman, in consequence of a communication made to him by a foreigner residing abroad, for certain improvements in preparing animal charcoal.—15th January, 4 months.

To John and George Rodgers, of Sheffield, in the county of York, cutlers, and Thomas Fellows, junior, of New Cross, Deptford, in the county of Kent, Gentleman, for their having invented an improved skate.—18th January, 2 months.

To Andrew Smith, of Princes Street, Leicester Square, in the parish of St. Martin's in the Fields, and county of Middlesex, engineer, for his having invented or found out certain improvements in machinery for propelling boats and other vessels on water, and in the manner of constructing boats or vessels for carrying such machinery.—22d January, 6 months.

To John Gottlieb Ulrich, of Nicholas Lane, in the city of London, chronometer maker, for his having invented or found out certain improvements in chronometers.—22d January, 18 months.

To Charles Mepham Hannington, of Nelson Square, in the county of Surrey, Gentleman, for his having invented an improved apparatus for impressing, stamping or printing for certain purposes.—22d January, 6 months.

To Louis Schwabe, of Manchester, manufacturer, for his having invented certain processes and apparatus for preparing, beaming, printing and weaving yarns of cotton, linen, silk, woollen and other fibrous substances, so that any design, device or figure printed on such yarn, may be preserved when such yarn is woven into cloth or other fabric.—22d January, 6 months.

CELESTIAL PHENOMENA,

FOR FEBRUARY, 1831.

D.	H.	M.	S.	
1	5	0	0	☾ in conj. with 1 γ in Virgo
4	8	13	0	☾ in □ last quarter
4	23	0	0	☾ in conj. with γ in Libra
5	0	0	0	Clock before the ☉ 14 *m.* 19 Sec.
5	10	0	0	☾ in conj. with ψ in Libra
6	3	0	0	☾ in conj. with φ in Oph
7	0	0	0	☿ Stationary
9	8	0	0	☾ in conj. with *d* in Sagitt
10	0	0	0	Clock before the ☉ 14 *m.* 34 Sec.
10	7	0	0	☾ in conj. with ☿ long. 27½° in Sagitt ☾ lat. 2° 52' N. ☿ lat. 2° 0' N. diff. lat. 52'
12	4	59	0	Eclip. conj. or ● new moon
13	6	0	0	☽ in conj. with ♀ long. 1° in Aquarius ☽ lat. 36 S. ♀ lat. 1° 24' N. diff. of lat. 2°
13	9	0	0	☽ in conj. with λ in Aquarius
13	19	0	0	☽ in conj. with φ Aquarius
14	11	0	0	♀ in conj. with λ in Aquarius
15	0	0	0	Clock before the ☉ 14 *m.* 29 Sec.
16	13	0	0	☽ in conj. with ν in Pisces
16	17	0	0	♅ in conj. with ι in Capri
17	9	0	0	☽ in conj. with 2 ξ in Ceti
17	16	0	0	☽ in conj. with μ in Ceti
18	12	0	0	☽ in conj. with f in Taurus
18	20	13	0	☉ enters Pisces
19	2	59	0	☽ in □ first quarter
19	3	0	0	♀ in conj. with θ in Aquarius
19	8	0	0	☽ in conj. with γ in Taurus
19	10	0	0	☽ in conj. with 2 δ in Taurus
19	15	0	0	in conj. with α in Taurus
20	0	0	0	Clock before the ☉ 14 *m.* 6 Sec.
23	0	0	0	☿ in conj. with ♃ long. 7° in Cap. ☿ lat. 23' S. ♃ lat. 27' diff. of lat. 4'
24	14	0	0	♂ in conj. with δ in Aries
25	11	0	0	☽ in conj. with α in Leo
25	23	0	0	☽ in conj. with ρ in Leo
26	2	0	0	♀ in conj. with ζ in Capri
26	8	14	15	Beginning } Eclipse of the Moon
	4	49	45	Opposition } Eclipse of the Moon
	6	11	0	End } Eclipse of the Moon
12	11	0	0	♀ in conj. with ♅ long. 8° in Cap. ☿ lat. 49' S. ♅ lat. 37' S. diff of lat. 12'
26	22	0	0	in conj. with π in Leo
28	0	0	0	Clock before the ☉ 12 *m.* 55 Sec.
28	14	0	0	☾ in conj. with 1 γ in Virgo

The waxing moon ☽.—the waning moon ☾

Mr. Adams' Meteorological Table, has not been received this month.

Guthrie, Printer, 15, Shoe Lane, Fleet Street.

THE

London

JOURNAL OF ARTS AND SCIENCES.

No. XXXVI.

[SECOND SERIES.]

Original Communications.

Art. VI.—On the Employment of Machinery.

To the Editors of the London Journal of Arts.

Gentlemen,—In continuation of the remarks which you favoured with insertion in your Journal of last month, upon the necessity of employing machinery in our manufactures, at the present unsettled crisis of public affairs, I propose now to take a more extended view of the subject, in hopes of adducing further proofs of its absolutely essential and beneficial results.

To combat the ridiculous opinions which prevail in the minds of many, otherwise intelligent members of the community, relative to the causes of its production, would be to enter the list of argument merely to show your prowess

in opposing and conquering shadows. It is not the matter for present consideration, why and how its creation took place, but to endeavour to ascertain how far that creation was advantageous or detrimental, and how far its continued advancement is necessary to our existing condition and future welfare.

Until the introduction of the steam engine, you must be well aware machinery could only be employed to a very limited extent, not having before possessed sufficient power to put it into general and active use, so few spots being adapted for the purpose of carrying on manufacture; but, since the means this wonderful invention has afforded, we find it gradually extending itself in every direction, advancing our commercial interests, employing capital, and increasing our wants and demands in equal proportion to the facilities of supplying them. None capable of forming an opinion on the question, will I think, pretend to deny the advantages resulting to us as a nation from extended commerce; or that the quickness, cheapness and superiority of our manufacture alone, can purchase such extension; yet many who subscribe to this, are inconsistent enough to aim a death blow at our prosperity, by repressing almost to exclusion, the only possible means of obtaining these ends at which we constantly labour to arrive. It is a natural inquiry, how is this cheapness to be effected, and how this superiority acquired? The answer as readily suggests itself—*by invention*, which may tend to supersede labour in any particular branch of production; by careful and unremitting pains to improve that machinery which enables us to produce at all, and by lending a willing hand, and encouraging reward to assist the progress of mechanical knowledge.

It is a prevalent idea, that if machinery be allowed to go on increasing, in the course of years it will prove so

injurious in its use, as almost entirely to subvert the industrious efforts of manual labour. This is certainly an erroneous opinion; at all events the period of producing such an effect, if it were ever possible, must necessarily be so far distant, as to render discussion on such a point useless; as well might we neglect all learning and science for fear of too early an attainment unto perfect knowledge. Its limited operations against the exercise of manual labour at the present time (if such can be proved) propose a subject for more immediate consideration, and the fact of labour being vastly increased by its use, leaves no ground for drawing a conclusion prejudicial to its continuance, or unfavourable to its results. To construct and frame a machine (it is to be remembered) numbers are and ever will be required; others to attend or work when completed; and the quantity of manufactured produce by aid of such machine rendered considerably cheaper, thus more largely disposed of, enables the manufacturer, by multiplying his business, to give more universal employ.

For instance, if a machine be invented to perform in the same space of time, that which has previously furnished occupation for six able men, it is supposed by many, who at best are but careless examiners, that these six consequently are thrown out of work, and must starve in idleness. Here is an obvious mistake. This machine must be manufactured too; it will require we say, for the sake of argument, half the number (though perhaps not the same individuals) to make or fit it up, one other to overlook it, if ever so perfectly contrived, thus providing for four; and I may safely venture to state, that nearly double that number will gain employment in different departments of the business, by the increased consumption and demand occasioned by the cheapness and superiority of the article fabricated. If formerly you could

afford but two suits of cloth dress, and one wardrobe of linen clothes per year, and are now enabled at the same price to procure four of the former, and two of the latter, will you not rather, for the sake of encouragement and the love of respectability, purchase the greater quantity of new, being attended with little or no additional expense? In this manner could we proceed ad infinitum without injury to the labouring poor, if other nations were permitted freely to exchange those articles of provision absolutely needful for subsistence, to supply cheaply the lower orders of the community; the dependance on each other for markets would be equal, so that the more our machinery aided by population could produce, in the same proportion would our means of subsistence and wealth increase.

Thus then we have seen that if a machine throw half the number of hands occupied in any particular branch out of their labour, it likewise opens a ready channel of employment for nearly double the number in different directions, and includes their services in the general extension, whilst the manufacturer obtains a small, though remunerating profit from his rapid and more extensive sales. Such a system of fabrication must be highly advantageous to ourselves at home, and would be infinitely beneficial to our interests abroad, if unoppressed by duties and restrictions.

Were it not for the aid of machinery, how would our immensely increased population subsist? Where could they find employment? It has demanded nearly an additional 10 millions of hands to supply its wants, and what are to become of these, if we stand still or retrograde? It appears from recent calculations that in the cotton trade alone, about £.100,000,000 of capital are employed, producing goods equal to the value of £.54,000,000

sterling annually. We will upon supposition state the capital employed in the manufacture of woollen cloth at half this sum, namely £.50,000,000 sterling, producing goods equal to £.27,000,000 per annum; thus including in these, our leading branches of commerce and manufacture, capital to the amount of £.150,000,000 and annual production to the amount of £.81,000,000 Here, let the enemies of machinery, and those who would limit its progress, consider how, in event of their wishes succeeding, could this enormous capital be invested, and how its interest defrayed; the whole united population of the kingdom, if manual labour alone were resorted to, would be inadequate to employ one half the amount, consequently the other half must be lying idle and unproductive, at a period when we require the whole mental and bodily energies of the nation upon their utmost stretch, to enable us at all to support our disastrous burden of overwhelming taxation.

Machinery, by which our real wants are supplied, and fictitious ones excited, and our *population* the means enabling us to work it, have advanced together, and so they must continue to do, or hurry on universal destruction; these alone, that is the population which originates, and the machinery which supplies, compose the real strength and wealth of our country; but they too must gradually sink under a heavy and accumulated load of misfortunes and grievances, unless speedily relieved, by allowing us the necessary means of subsistence at an attainable and moderate price; suffer our labouring poor to feed upon the corn of other countries, which from its severe exclusion, to meet the selfish wishes and interests of a few, might easily be conceived to possess properties deleterious or poisonous to the foreign consumer; give them this bread to eat, nor longer tantalize and provoke their

patience by exposing to their view a plentiful repast, at the same time denying its use, because the produce of another soil; then will no more such disgraceful scenes as have lately ravaged the heart of England occur, but occupied and fed, will they immediately desist from looking around for objects on which to reek their vengeance; unfortunately so misguided as to be spent in malicious attacks upon their best friends and only future hopes—machinery, inventions, and improvements.

What, let me ask, would these warm advocates of the present popular calmour against machinery judge of that physician, who would create and irritate a spreading wound and immediately refuse the assistance of salutary medicines to restore the part affected to its natural health? Would they not loudly and justly denounce him for such reprehensible conduct, and readily apply to his character the opprobrious epithet of empiric? But, first, let them look at home, or in censuring him they will equally reprove themselves, for they are far more dangerous quacks who labour to undermine the general constitution and universal system. The cases are similar, for now that our population has increased to an hitherto unknown degree, and still continues to do so, they would, by way of cure, for what they fancy this distempered state of things, forbid the use of machinery, and sweep it inconsiderately away, therewith removing the means of the labouring poor gaining even half that scanty pittance it at present affords them, and for the supposed benefit (though to the certain injury) of a few, destroy most wantonly the livelihood of thousands, and I may say millions.

To prove that nothing can advance the prosperity and increase the wealth of a country more rapidly than machinery, we need only look to the truly surprising

continent of America, where industry, perseverance, and ingenuity conspire to threaten us with an ultimately triumphant rival. Entreat and persuade them to repress and banish the use of this automaton power and imagined evil, would they not (think you) ridicule such a preposterous and absurd proposition, and deem him mad who preferred such an unreasonable request; they cannot plead the absolute necessity which we must, their rising population are easily capable of being amply provided for in the cultivation of immense unoccupied tracts of land for a long succession of years—they have no cause to labour under apprehension or dread from the inundating flood of overgrown population; yet, they even prefer (employing their capital and labour in commerce) to the tilling of an average fertile and vastly improving soil, and gladly suffer us to transport our own intestine strength amongst them, to busy our narrow and blinded minds in the performance of what they positively neglect. How much better and more profitably could we be employing the valuable services of such at home, if but properly encouraged and supported; for as what we can produce constitutes our wealth and importance, by hastily dismissing those who could, if employed, furnish productive labour, we must necessarily be impoverishing ourselves to the enrichment of others. Here then, we have a direct instance how machinery (independant of agricultural exertions) tends to multiply labour and employ, for as fast as it can occupy or *consume* (if I may be allowed the term) this article of production (population), just so fast in proportion does the demand and the production increase. It is this that stimulates the increase, and not the increase it, and if judiciously and liberally regulated, not taxed or restricted, it will cause industry to thrive, and

create labour and employ for the whole community; and the more disposed the kindness and liberality of government be to favour and accelerate its use, so much the more shall we be wealthy, properous, and happy.

Nothing can be more absurd than to imagine we can benefit ourselves by destroying this ladder, as it were, by which we have climbed to such an elevated station and unrivalled splendour. Is it reasonable to suppose that if we choose to waver on the summit, and fall back into comparative obscurity, it would be attended with little or no difficulty again to outstrip the rapid progress and ceaseless endeavours of neighbouring nations—all equally anxious to make our knowledge and experience the stepping-stones to their future greatness, or that others will remain passive spectators, and make no attempt, not one single effort, to gain that superiority to which we have aspired, and undoubtedly arrived. But if the popular voice were consulted and obeyed, from which we must inevitably fall, could we obliterate every trace of our industry and ingenuity, and compel every people, eager in their pursuit of commerce and anxious to excel in manufacture, to forget the gratifying, yet astonishing sights of mechanical power and inventive genius, which England has shown to the world—could we entirely erase those impressions of mechanical science, indelibly graven on their remembrance by the watchful observation of rivalrous and jealous eyes—then might the expediency of limiting or suppressing machinery become a subject for deliberate discussion; but as these conditions are impossible, it is no less possible for us to prohibit or restrict its use, to curb the spirit of invention, or neglect mechanical improvement, and yet remain in security, or repose in invigorating peace, blessed by the lavish favours of refine-

ment, luxury and civilization—beloved at home, and respected abroad—the instructress of the world, and the leading star of Europe.

Soliciting the favour of your permission to renew my correspondence,

I remain, Gentlemen,

Yours, &c. &c.

Stroudwater. H. C. Harris.

Art. VII.—On the tempering of metallic Wires and Springs for Chronometers, Watches, Musical Instruments, &c.

To the Editors of the London Journal of Arts, &c.

Gentlemen,—A course of experiments, in which I have lately engaged myself, has drawn my attention to the subject of the "*spirit,*" as workmen technically call it, of metallic springs. The connexion of this subject with various important branches of our arts may claim for it a small space of your valuable publication. In respect of the more important interests of navigation, as well as of numerous minor purposes, a few practical observations may prove serviceable, by extending the knowledge of this ramification of science. Springs are made perfectly well for different objects, so far as the manufacturer is concerned,—but a more general information as to their different temper, and the principles of such difference may tend to the more correct and perfect adaption of elastic substances to the required end of the workman who uses them.

I am indebted for much of the following information to an old French memoir, originally published in 1774, by M. Le Roy, pere, the celebrated watchmaker of Louis XV. Certain experiments in acoustics have supplied me with proofs of his correctness, and with some generally useful memoranda.

A bar of steel or iron, after being sufficiently hammered or subjected to the action of fire, becomes successively yellow, violet, blue, grey and white. The variations in degree of these processes will partly depend upon the state and quality of the metal operated upon. Although philosophers are agreed that all hard bodies are elastic, yet hardness does not constitute *the measure of elasticity*, for a glass ball is much more elastic than an equal globe of cast iron; but their difference of hardness is by no means proportioned to that of their elasticity. A Damascene, or Moorish sword blade, is more springy or elastic than another, which shall notwithstanding make an impression upon the edge of the former. Now, this difference arises from the varied mode of tempering the respective blades. The steel or iron, after each transition above noticed, is said by the French to become *revenu*.

M. Le Roy informs us that he took three wires of common steel, to which he suspended weights, and put them in pendulous motion. They did not maintain their vibrations beyond seven minutes. He then tempered them to the fourth, or grey state; in this stage of *revenu* the same wires maintained the vibrations of their masses during the space of 50 minutes. A wire of *cast* steel, which maintained the vibrations of its suspended weight for 10 minutes, continued them after it had passed to full blue *(gros bleu)* an hour longer. From Dr. Thompson's published tables of Cohesion, we learn that the power, or force of cohesion of bar iron, is to that of cast iron nearly

as 75:50; for to tear asunder rods of each species, an inch square at the base, it required 74,500 lbs. avoirdupois, to destroy the cohesion of the particles of the bar iron rod, and 50,100 lbs. to effect the breaking of the cast iron rod. The elasticity or *spirit* of tempered steel springs appears, therefore, to be in an inverse ratio to their power of cohesion. An untempered wire of a harpsichord, maintained its vibrations for 14 minutes; after being tempered to grey-white, it maintained its suspended weight in motion nearly an hour. A wire of cast steel was tempered to *gros bleu* and then was diminished (i. e. untempered) and polished, in which state it vibrated only 17 minutes, but upon the *revenu à gros bleu*, it vibrated 67 minutes. These general facts serve to show the great advantage of understanding the variations of tempering, as affecting the elasticity of springs, and their consequent fitness for any required purpose. Our author appears to have applied his knowledge to the formation of the best chronometer work of the period, in which art he gained a high reputation.

But mere soft metallic wires and springs without any temper will not vibrate well, nor maintain for any great length of time a suspended pendulum-nob in motion. A copper wire is unsuited for these purposes; a brass wire is suitable in proportion to the quantity of zinc in its composition, so that it does not exceed one-half; the usual proportion is four parts of copper to one of zinc. About two years after the publication, by M. L. Roy, of his experiments, Count Bruhl, the ambassador from the court of Dresden to St. James's, and M. Phillidor, had several piano-fortes made, and strung with wires tempered *gros bleu*; they were universally acknowledged by amateurs, and the Royal Academy of Paris, to be superior in tone to instruments chorded with the usual steel wire. The

progress which is making in the general application of scientific principles to our various branches of manufacture, induces me to hope that these few reminiscences may prove useful to some of our artists and operatives.

ÆOLUS.

Recent Patents.

To JOHN LAWRENCE, *of Birmingham, in the county of Warwick, silversmith, and* WILLIAM RUDDER, *of Eye, in the county of Gloucester, gentleman, for their having invented or found out an improvement in saddles and girths, by an apparatus affixed to either of them.*—[Sealed 10th August, 1830.]

SPECIFICATION.

"OUR improvements in saddles, and in girths for fastening saddles to the backs of horses and other animals intended to be ridden, consists in the adaptation and attachment of a metal box or case containing springs, to the girth, or to those parts of the saddle by which the girth is intended to be connected to it; which contrivance is designed for the purpose of affording a degree of elasticity to the girth, that is, to allow the girth to contract or elongate after it has been drawn up tight round the body, so as to accommodate itself to any increase or decrease in the bulk of the animal, and at all times to remain tight without the necessity of frequently adjusting its tension.

"This improved apparatus, which we call a *constrictor*, consists of a metal box or case of about four or five inches square, or rather longer in one direction than the other, and sometimes slightly deviating from a rectangular form, and about a quarter of an inch in thickness or depth: within which box or case, a series of steel springs are to be placed; the springs being formed and combined in such a manner as exhibited in the drawings, and hereinafter described, with reference thereto.

Plate XIII, fig. 1, represents the apparatus in its most simple construction, consisting of a box, containing a series of bow springs placed in couples, the external parts of their curves acting against each other, and their ends being confined by two guide bars, near the sides of the box.—*a, a, a, a*, is a metal frame, which, with a thin plate at bottom, and another at top, constitutes the box to hold the springs. In this figure the top plate is removed, in order to show the form and situation of the springs within; *b, b, b*, are a series of bowed pieces of steel in pairs, placed in contact, the external surfaces of each pair bearing against the adjoining bow, and together constituting a spring on what is called the grass hopper principle; *c, c, c, c*, are straight bars placed along the bottom of the box, on to which, notches at the undersides of the bow pieces fit, for the purpose of keeping the bow pieces in their proper situations, and causing them to preserve their parallelism when the spring expands or contracts; *d, d*, is a sliding drawing bar, placed at the back of the outer bow piece, to which bar the drawing plate *e, e*, is affixed by screws, rivets, or any other means; and *f, f*, are loops or staples, with each a roller, attached to the reverse extremity of the drawing plate, to which the girths or straps are connected.

" The construction of the apparatus being described, it only remains to show its mode of adaptation to saddles and girths, and the effect produced by it.

" Let the box or constrictor be made fast to the saddle, by the buckler *g, g*, and let the girth or girths be connected to the drawing plate, by the straps *h, h*; when the girth or girths have been drawn tight round the body of the horse or other animal, the spring will be compressed by the force of the drawing bar exerted against the hindermost bow piece, and the girth will be held in tension. If the body of the animal should shrink some time after the girth has been drawn tight round it, the force of the spring retiring from its state of tension, to that of rest, will draw up the girth, and hence keep the saddle tight upon the back of the animal; or in the act of leaping, or any other violent exertion, to which a horse might be exposed, should the body suddenly expand, the spring will become compressed, and the girth consequently give out, that is elongate, to accomodate itself to the circumstances, always however keeping tight round the animal.

" It is only necessary further to remark, that whether the constrictor be attached to the saddle by the buckles *g, g*, as above described, or by the straps *h, h*, of the drawing plate, we consider to be indifferent, provided the girth is connected to the opposite.

" Another mode of forming and connecting a series of springs, suited to the same purpose, is shown at fig. 2, which, like the former, represents the box or case, having a strong metal frame *a, a, a, a*, placed round it, with a thin plate at bottom and top (the latter being removed); *b, b, b, b*, are a series of angular springs, each of which is formed nearly in the shape of the letter L, and when combined, as shown, constitute one powerful spring; *c, c*,

are pieces of metal fastened to the bottom of the box, for the purpose of confining the springs, and forming the fulcrum, against which they act; *d*, is a lever turning on a fixed pivot at *e*, the reverse end of which lever is connected by means of its hook to a pin *f*, in the swivel bar attached to the drawing plate *g*, *g*. A bar or lever *h*, connects the lever *d*, to the springs *b*, by pins or joints, and hence supposing the constrictor to be attached to the saddle, by the buckles or straps as before described, when the drawing plate *g*, *g*, is drawn out by the girth connected to it at *h*, the springs *b*, will be brought down and hold the girth with considerable tension, but affording to the girth the means of giving out or contracting according to the enlargement or shrinking of the animal's body.

"Another mode of constructing the apparatus is shown in fig. 3, which represents the box or case with its rim or metal frame *a*, *a*, *a*, *a*, *a*, (the top plate being removed) and containing a series of curved springs *b*,*b*,*b*, confined by the fulcrum piece *c*. Against the end of the outer spring, the lever *d*, is made to bear, its pivot or fulcrum being at *e*; the reverse end of this lever is connected by the compound levers *f*, and *g*, to the drawing plate *h*, *h*, which slides in grooves *i*, *i*. It will hence be seen that if the apparatus be connected, by means of the buckles to the saddle, as before described, and the girth to the drawing plate, that on pulling the girth tight, the drawing plate will be brought down, and with it the levers and springs; when the girth will be held with considerable tension, but capable of giving out or contracting according to the necessity of the case, and still remain tight round the body of the animal.

"Now we have herein shown and described only three modes of forming and combining a series of springs, with

levers acted upon by a drawing plate within a thin case, or box of metal; yet, we do not confine ourselves precisely to the particular forms and positions of the springs and levers shown, as they might be varied without deviating from the principle of our invention, and perhaps answer the purpose nearly as well. We therefore wish it to be understood that we claim as our invention, the combination of a series of springs, of whatever form and however arranged within a metal frame, box or case, with a sliding drawing plate or bar, the said apparatus being attached to a saddle, and also connected to a girth, for the purpose of holding the saddle at all times tightly on the back of the horse or other animal, without requiring adjustment, should the body of the animal expand or contract while ridden.—[*Inrolled in the Roll's Chapel Office, February,* 1831.]

Specification drawn by Mr. Newton.

To John Melville, *of Upper Harley Street, Cavendish Square, in the county of Middlesex, Esq. for his having invented certain improvements in propelling vessels.*—[Sealed 18th September, 1828.]

SPECIFICATION.

"My improvements are intended to apply to the propelling of vessels by steam or other power, in a line parallel with the direction of the vessel's course, in such a manner as that the propelling apparatus shall be little or no impediment to the progress of the vessel, when under sail, and be capable of ready application when the sails cease to act, thereby obtaining, as may be necessary, the advantages of motion, either by the ordinary use of wind, or by mechanical means, as hereinafter described.

"I have three methods of effecting my object, each of which I propose to use jointly in pairs, or severally, as circumstances, connected with the size, form and stowage of the vesssel, may render most advantageous.

"The method which I shall first describe, and therefore denominate my first method, consists in placing on each side of the vessel two pairs of folding paddles, (see Plate XIII, fig. 5;) the other two pairs being precisely similar, but situated on the farther side of the vessel.

"These folding paddles seen also in their horizontal positions at *a, a,* fig. 6, are made of any suitable material, as of metal or wood, and of a size proportionate to the size and required speed of the vessel; the paddles are attached, by hinged joints, to the beams or stems *b, b,* which form part of the traversing frames *c, c,* and they fold or shut up, and present only their edges to the water when moving forwards; but open or expose a large surface to it when moving backwards, being prevented by the stops and the connecting braces, from expanding beyond an assigned angle.

"The traversing frames *c, e,* are kept to the side of the vessel by grooved guides *d, d, d, d*; and arefu rnished with friction rollers at the ends, and at their middles, to keep them steady, and to facilitate their motion in the guides.

"On the frames to which the paddles are attached, are toothed racks *e, e,* which are acted upon by the toothed wheels *f, f,* the axes of which pass quite through the vessel, and terminate in similar wheels, which act upon similar traversing racks on the opposite side of the vessel. To the piston rod of the steam engine, the cylinder of which may be either situated above or below the plane of the axes and placed in a position somewhat inclined, as represented by *g,* is attached a rod *h, h,* sup-

ported by guides, which rod passes under a pinion on the axis of one pair of the wheels, and over a pinion on the axis of the other pair of wheels, or vice versa. The parts of the rod passing under the one pinion and over the other, are furnished with racks, whose teeth act upon the pinions, and thus by the alternating motion of the piston of the engine, cause one pair of the paddles to move forwards, while the other pair is moving backwards: in this manner one pair of the paddles is kept continually in action. The paddle stems or axles, which, with the braces *i, i, i, i,* are bevelled off to an acute angle on one side, are attached by hook and eye hinges to the upper parts of the traversing frames, and to the lower parts by screw bolts, represented at *k, k*; and by this arrangement the paddles can be unshipped and removed from the side of the vessel whenever the state of the wind renders their application unnecessary.

"The upper grooved guide *d, d,* is attached to the side of the vessel in such a manner, as to admit of its being adjusted according to the dimensions or wearing away of the traversing frame.

"The second method consists in attaching similar folding paddles to the ends of two or more metal rods with such guides and supports, as may be necessary, projecting through stuffing boxes, under the water lines in the stern of the vessel. These projecting rods, represented at *r, r,* fig. 6, are connected with the piston of a steam engine, by means of a rack *b,* pinion *c,* and a toothed wheel *d.* The projecting rods have flush joints at *e, e,* secured by two bolts, one of which is the pivot of the joint, and the other for keeping the rod straight.

"When the rod is detached from the rack, and its holding bolt withdrawn, it may be pushed out till the joint is free to turn outside the vessel, when the end which car-

ries the paddle may be elevated out of the water, so as to admit of the paddle being removed; after which the rod is again let down and drawn inwards until the whole be within the vessel, except its end, which must be left in the hole or stuffing box to prevent leakage; so that there are no exterior appendages, except when the paddles are in action.

"Fig. 7, represents the third method, where *a, b*, is a double acting pump, connected with a steam engine, the cylinder of which is in a parallel motion; *c, d*, are two supply pipes from the bows of the vessel: *e, f*, are pipes leading towards the stern, and terminating in the air vessel *g*; *h, i*, are pipes of discharge, the apertures of which, at their terminations, are diminished, in proportion to the velocity required in the vessel's speed, and have the form best adapted for obtaining the greatest effect; *k, l, m, n*, are four valves, two of which open into the pump, and two into the air vessel.

"Supposing the piston moving in the direction from *a*, to *b*, the valve *l*, will shut, whilst the valve *k*, will open and admit the water into the pump, through the pipe *c*; the water on the opposite side of the piston having been previously admitted through the pipe *d*, will then be forced through the pipe *f*, and valve *n*, into the air vessel, and from thence be expelled through the discharge pipes *h*, and *i*; when the piston moves in the contrary direction, a similar effect takes place through the pipes *d*, and *e*, and thus a continual propelling action is produced.

"The circumference of the piston of the pump is not intended to touch any portion of the cylinder, but to move entirely free of it, the rod of the piston passing through the stuffing boxes at its ends. The three plans above specified, seem equally well adapted for inland and sea navigation.

" Being aware that attempts have been made by others to apply folding paddles, as well as the force of water issuing from pipes, to the purposes of propelling vessels, I do not claim as my invention the exclusive application of these means of propelling, but I claim the above described machinery and improved methods of effecting that object."—[*Inrolled in the Inrolment Office, March,* 1829.]

To William Chapman, *of the town and county of Newcastle-upon-Tyne, Civil Engineer, for his invention of a certain improvement or improvements in the construction of waggons that have to travel on railways or tram ways.*—[Sealed 14th August, 1827.]

The Patentee commences his Specification by pointing out a serious evil attendant upon the ordinary construction of tram waggons employed on rail roads. The under part of the ordinary waggons are made as nearly flat as possible, and the two axles are so attached to the under part of the waggon, that the peripheries of the four wheels shall all be exactly in the same level line, in order that they may bear equally upon a truly level road; but if it should so happen that one of the rails becomes bent or sinks below the level of the other parts of the double line of rails, it then follows that the waggon in passing over such unequal parts of the rails, must at times be supported upon three wheels, or perhaps upon only the two wheels at the opposite corners, thereby throwing the whole weight of the waggon upon those two parts of the rail with which the two wheels are in contact, instead of distributing the weight equally; hence the carriages become strained, and the rails, by the additional weight, subject to break, and also their progress is considerably impeded by the jumps and concussions as they advance. To remedy this evil,

is the principal object of the Patentee, and this he does, by allowing the axles a small degree of play at one end, instead of fixing them firmly to the under part of the carriage, as heretofore.

Plate XIII. fig. 4, is a side elevation of a rail way, carriage or tram waggon, with the improved contrivance adapted thereto; *a, a,* is the body of the waggon; *b, b,* its bed; *c, c,* its running wheels; *d, d,* a swinging bar attached to one side of the waggon, by the pivot and loop *e.* The axles of the running wheels on this side of the waggon, bear in the circular recesses, near the ends of the swinging bar, but on the opposite side of the waggon they are confined in boxes affixed to the under part of the bed, and therefore on that side, the ends of the axles are only allowed to turn in the boxes, having no play, while the ends of the axles on this side of the carriage, by means of the swinging bar which receives them, are enabled to move up and down.

If the surfaces of the ground rails *f, f,* be perfectly flat and parallel, the axles of the running wheels of the waggons will preserve their parallelism, and the weight of the load be equally distributed between the four wheels, the swinging bar remaining horizontal; but if a part of the rail becomes bent and sunk, as at *z,* then the wheel in passing over that part, will descend into the hollow, and the swinging bar will move out of the level or horizontal position into that shown by dots, the weight of the load being still divided and supported between the wheels, through the intervention of the swinging bar, vibrating upon the pivot at *e*; consequently the carriage will not be strained as it would be in the ordinary construction of tram waggons, when it may so happen, from any irregularity of the rail way, that the whole of the weight is thrown upon three, or perhaps two of the wheels.

In order to grease the axle of the wheel running in the

recess of the swinging bar, the Patentee proposes, as a second feature of his invention, to suspend upon a weighted lever, a pad of leather or other suitable substance, containing a quantity of grease, which, by bearing against the under part of the axle, gives out the grease requisite for relieving the friction of the axle against its bearing in the swinging bar, as the wheel goes round. This contrivance is shown at *g*; the pad, containing the grease, at *h*, being attached to a lever, and made to bear upwards against the axle, by the force of the weight *i*, at the opposite end of the lever.

These contrivances may be adopted to any construction of railway carriage, and will effectually prevent the carriage being strained, by the weight running on three wheels or on the two wheels at the opposite corners, as above described, the four wheels being always brought in contact with the rail and supporting the weight, however uneven the rail may be.—[*Inrolled in the Inrolment Office, October,* 1827.]

To William Spong, *of Aylesford, in the county of Kent, Gentleman, for an invention for diminishing friction in wheel carriages, water wheels, and other ratory parts of machinery.*—[Sealed 15th August 1827.]

This invention consists in adapting an anti-friction roller to the bearing of a rotatory axle, and is applicable in several ways to remove or reduce the friction of an axle against its bearing: as the friction of contact between the axle and the box of a carriage wheel, or the journeys of the axle of a water wheel, or any other axle of machinery, which rubs as it revolves against its bearing, or is pressed upon by its bearing as it revolves, the pressure being in a perpendicular direction.

For ordinary carriage wheels, it is proposed to adopt short moveable auxiliary axles, extending from the sides of the carriage, instead of continuing the elongated fixed axles, as in the usual construction of wheel carriages.

Plate XIII, fig. 8, shows the proposed improvement as attached to a carriage; *a*, is a frame of iron passed under the carriage in place of the ordinary axle; *b*, is one of the short axles, supported by and turning in bearings *c*, *c*, into the sockets of which it is made to fit accurately, and allowed to revolve; *d*, is that part of the short axle on to which the running wheel is to be fixed; *e*, is an anti-friction roller, attached to the end of the frame *a*, by a screw or pin, and against the periphery of this roller the groove *f*, of the axle bears as it goes round.

It will be perceived that by the intervention of this anti-friction roller, a great portion of the friction will be taken off, which in the old construction of axles and their boxes would be created by the rubbing of the axle against the interior of the box.

There are receptacles *g*, *g*, proposed to contain oil, with small channels, leading down through the bearings to the axle, by which it receives the lubricating fluid.

Fig. 9, is another mode proposed of adapting the principle of the anti-friction roller to the axle of a wheel, as of a water wheel, or any other machinery, or large wheel of that kind; *a*, is the end of the axle of the wheel, bearing on the anti-friction roller *b*, which turns in bearings, and the axle of the large wheel is confined between the standard *c*, *c*.

The same sort of contrivance is proposed to be adopted, with some slight variations in the modes of attaching it; but as the contrivance, it will be perceived in its principle features, has long been known to the public, and is in very general use, we need not extend our description of this

invention further, but must be allowed to express our astonishment at finding the contrivance, proposed as a novelty and ushered into the world in the present state of mechanical science, under the authority of a patent.—[*Inrolled in the Inrolment Office, February,* 1828.]

To Benjamin Merriman Combs, *of Birmingham, in the county of Warwick, for his invention of certain improvements in, or additions to a pulley machinery, and apparatus used and applied for securing, fixing, and moving curtains, and rollers, and other blinds.*—[Sealed 30th August, 1827.]

The Patentee conceives that the ordinary construction of rollers and pulleys for window blinds, do not afford those facilities for raising and lowering the blind which might be wished, and therefore proposes to adapt certain appendages to the ordinary construction of rollers and pulleys, which shall render them more convenient than heretofore.

These appendages consist of a circular ratchet to be attached to the roller, and a lever pall to take into the ratchet, in order to hold the blind at any desired elevation.

At the end of the roller placed over the top of the window (to which the blind is attached) the circular ratchet is fixed, with a deep grooved pulley to receive the cord wound upon it, when the blind is let down. The pall for the ratchet is a bent lever, embracing nearly half its periphery, and weighted at the catch part, in order to keep the catch in the ratchet. From the reverse end of this lever, a cord passes down over guide pulleys with a tassel below.

The operation of this apparatus is, that on pulling the tassel, the cord depresses the end of the pall lever, and

raises the catch out of the ratchet, when the roller being released, the weight of the blind, causes it to descend until stopped by letting the catch drop again into the ratchet; at the same time a cord attached to the pulley of the roller, winds itself upon the pulley, and when it is required to draw the blind up again, this cord being drawn down, raises the blind by turning the roller.

The circular ratchet may be varied in its construction from that of an ordinary ratchet wheel, by making its teeth on the face instead of the rim of the wheel, and the pall may be, instead of the hook shape above described, formed as a wedge in several ways, and be drawn out of the circular ratchet by a cord and handle, in any convenient manner.

We do not perfectly understand all that the Patentee appears to contemplate in this contrivance, but we presume, that the general features of his intention will be seen; that is the circular ratchet and its pall, called an over balance catch. The contrivance is said to be applicable also to bed curtains, but the manner of adapting it is not described.—[*Inrolled in the Inrolment Office, October*, 1827.]

To William Dettmer, *of Upper Mary-le-bone Street, Fitzroy Square, in the county of Middlesex, pianoforte maker, for his invention of certain improvements on pianofortes.*—[Sealed 30th August 1827.]

The object of the Patentee in adapting this invention to piano fortes, is to enable the instrument, after having been properly tuned, to be brought into unison with other instruments of a different pitch, by raising or lowering the tone of all its strings by a simple operation, instead of the trouble of tuning each string separately.

The plan applies both to grand piano fortes and square

pianofortes, and whether horizontal or upright, and consists in adapting to the ordinary constructions of instruments, a series of tension bars or rods, with adjustments which are to extend across the instrument, and to be connected to the block in which the pins that hold the strings are fixed, the blocks being moveable for a short distance, not more than a quarter of an inch, but confined by the tension bars.

The general construction of the pianoforte, as to the keys and movements and the arrangement of the strings, the blocks for the hitch pins and for the rest pins, being the same as in other piano fortes, the novelty consists in attaching the ends of a series of metal bars or rods to the hitch pin blocks, and connecting the reverse ends of the same bars to the rest pin block; these bars being enabled to elongate or contract by means of adjusting screws.

Supposing each of the strings of the instrument to have been drawn up by the tuning key to the required note, that is properly tuned, but that when so tuned the whole should be found to be too flat or too sharp to play in concord with other instruments in a concert, by simply moving the adjusting screws of the tension bars, the blocks to which the strings are attached, will be brought nearer together to flatten the tone, or farther apart to sharpen it, as may be required, without deranging the tone or notes of the individual strings.

The Patentee says that both the blocks on which the strings are hitched, and that in which the rest pins are set, may be made to slide, but he prefers that the rest pin block only should move, and this may be done by passing the adjusting screws through the block into the tension bar, when by turning the screws, the block will be moved a short distance, and the tension of all the strings will thereby be increased or relaxed.

The same effect may be produced by means of wedges or levers, or some other contrivances, in place of the screws, but that which has been described is preferred.—[*Inrolled in the Inrolment Office, February,* 1828.]

To **Benjamin Geithner,** *of Birmingham, in the county of Warwick, brass founder, for his invention of certain improvements on castors for furniture and other useful purposes.*—[Sealed 13th December, 1827.]

The improvement proposed is designed to give stability to the stem of the castor, and to enable it to turn upon its pin with less friction than those of the ordinary construction. This is effected, by making the upper part of the vertical pin on which the socket of the roller carriage turns broad and partly spherical, which spherical part acts in a corresponding recess, in the upper part of the socket of the roller carriage.

Plate XIII. fig. 10, is a section of the complete castor; *a,* is the socket of the castor, into which the foot of the piece of furniture is inserted as usual; *b,* is the vertical pin riveted into the socket, upon which the carriage *e,* of the roller turns. The upper part of this pin, it will be seen, is enlarged and made in a convex form *c,* which fits into the concave part of the stem of the roller carriage at *d, d,* and the pin and roller carriage being attached and secured by a nut or rivet, the carriage is enabled to turn round upon the pin with a very firm bearing, and with very little friction.

The Patentee does not confine himself precisely to this construction, but sometimes forms the convex part of the pin upwards, and causes it to act in a corresponding recess in the under part of the socket *a,* which answers the purpose equally well.—[*Inrolled in the Inrolment Office, June,* 1828.]

To PETER BURT, *of Waterloo Place, in the parish of St. Ann, Limehouse, in the county of Middlesex, mathematical instrument maker, in consequence of a communication made to him by a certain foreigner residing abroad, for an invention of an improved steam engine.*—[Sealed 4th August, 1827.]

THIS invention consists in suspending the cylinder of a steam engine on pivots, by which it may be enabled to oscillate, for the purpose of placing itself and its working piston in a direct line with the throw of the crank, as it revolves, or of the beam as it vibrates, by which the intervention of a parallel motion apparatus is rendered unnecessary, and the general construction of the engine simplified, the stroke of the piston being communicated through its rod directly to the crank or the beam.

The piston rod, is proposed to be passed through the lower end of the cylinder, as by that means affording greater convenience to the operating of the engine, and the steam for working the piston, as well as that of the eduction, is carried through the pivots or gudgeons, on which the cylinder is suspended. The opening and closing of the steam valves may be effected by any of the common modes.

There is no claim made in the specification, to any particular mechanism as connected with the engine, but merely to the suspending of the cylinder upon pivots or gudgeons, for the purposes above described.—[*Inrolled in the Inrolment Office, February,* 1828.]

To WILLIAM JOHN FORD, *of the parish of Mildenhall, in the county of Suffolk, farrier, for his invention of certain improvements in the make, use and application of bridle bits.*—[Sealed 6th September, 1827.]

THIS contrivance is designed for a restive or ungovernable horse, which it is said to be capable of bringing into perfect order and governance; it consists in the construction and employment of a bit, with a double bar in the mouth of the horse, the cheeks of which bars have joints, allowing one of the bars to be moved from the other, by pulling the extra rein. The bar acted upon by the jointed cheek carries the port or circular projection, which, in the ordinary construction of bits, presses against the roof of the horse's mouth, but in this instance the port bar is passed under the tongue, and when brought into action by pulling the rein, bears downwards against the under jaw.

The leverage obtained by this contrivance is very powerful, and is said to be sufficient to curb the most vicious animal. After the horse has been brought to a state of management, the leverage may be removed by drawing the other rein, and allowing the curb rein to fall upon the horse's neck, when the bridle becomes one of ordinary power.

The claims set forth in respect to this invention are, 1st, the mechanical contrivance by which the port is made to act on the under jaw of the horse; 2nd, the capability of immediate relief to the horse, by pulling the other rein; and 3rd, on withdrawing the correction, the capability of using the bit as a gentle curb.—[*Inrolled in the Inrolment Office, November,* 1827.]

To JOSEHH HORTON, *of West Bromwich, in the county of Stafford, boiler maker, for his invention of a new and improved method of forming and making of hollow cylinders, guns, ordnance, retorts, and various other hollow and useful articles in wrought iron, in steel, or composed of both those metals.*—[Sealed 11th October, 1827.]

THESE hollow cylinders are proposed to be made by combining a series of bars of iron or steel, placed lengthwise round a cylindrical mould, and after bracing them together by means of iron hoops, and raising the temperature of the whole, in a furnace to a welding heat, the mass is to be beaten with hammers upon a mandrel, until all the pieces are united in a solid compact state.

It is proposed that the several bars shall be made in a small degree wedge-shaped in their sectional figure, in order that they may lay close together, when combined in a cylindrical form, like the stones round the arch of a bridge.

Several modes of effecting this object are proposed beside the wedge form, as for instance, a series of square bars may be laid, with triangular bars intervening, or some other mode may be adopted for bringing the sides of the bars nearly into contact, before they are submitted to the heat of the furnace; and when so heated to a welding state, the joints may be closed by tilt hammers, or by sledge hammers, as may be most convenient, according to the magnitude of the cylinder about to be made.

This plan is proposed for making cylinders of iron or steel for any purpose, but particularly for ordnance, which may be formed by these means, observing that the bars for that purpose, must be thicker at one end

than at the other, in order to afford such additional substance, as may be required towards the breech part of the piece.

When the gun has been thus formed upon a mandrel, and all the joints of the combined bars rendered perfectly sound by the operation of welding, it may be bored within, and turned without to its proper figure, and will be a much better and stronger gun than any heretofore made by the ordinary process of casting.—[*Inrolled in the Inrolment Office, April,* 1828.]

To RALPH REWCASTLE, *of Newcastle-upon-Tyne, Millwright, for his invention of a new and improved method of ballasting ships or vessels.*—[Sealed 13th December, 1827.]

THE intention of the Patentee is to ballast vessels by means of water introduced into the hold of the ships, instead of dry articles. In order to effect this object, he proposes to divide the hold of the vessel into a number of distinct compartments, by placing partitions between the ribs or timbers, which are to be made up by boarding, and the joints carefully caulked, so as to prevent the leakage of water; over the planking, is to be placed sheets of felt, such as are usually prepared for sheathing the bottoms of ships, and upon these may be placed sheets or plates of iron, which being made perfectly tight, will constitute a series of tanks capable of holding water, by which the ship is to be ballasted.

In such ships as are weak in their structure, it may not be desirable to form the compartments or tanks as parts of the vessel itself, it is therefore proposed, in those instances, to construct moveable tanks or boxes of iron,

which shall exactly fit those parts of the hold where the ballast is to be placed; and these tanks being filled with water, will answer the same purpose.

The tanks, whether made as compartments in the hold of the ship, or as distinct tanks to be placed in the hold, must be securely covered to prevent the water from flowing over, as the ship rolls or pitches, and pipes must be properly placed, leading to the tanks, for the purpose of conducting the water into these, and other pipes, to discharge it, which pipes must be furnished with stop cocks; and there must also be tubes in the tops of the tanks, to allow of the ingress and egress of the air.—[*Inrolled in the Inrolment Office, June,* 1828.]

To JOHN ROBERTSON, *of Limehouse Hole, in the parish of All Saints, Poplar, in the county of Middlesex, rope manufacturer, for his invention of certain improvements in the manufacture of hempen rope or cordage.*—[Sealed 4th September, 1828.]

IT is proposed under this Patent, instead of applying tar or resinous substances to prevent the decay of ropes, to employ a tanning material, in which the hemp after being prepared, is to be steeped, previous to spinning and twisting it into rope; which tanning operation it is conceived will so act upon the vegetable fibres of the hemp, as to render them incapable of that decomposition or rotting, to which ropes in general are subject when exposed to damp.

The tanning liquor is to be made from ground oak bark, or other substance of that kind, in the proportion of about three pounds of oak bark to every gallon of water, which mixture is to be continually stirred up till properly mixed. In this liquor the hemp is to be steeped, and

there to remain until it has become sufficiently saturated with the tanning material.

For the proper treatment of Russian or Italian hemp, it is considered that twenty-one days steeping would be necessary; but for New Zealand and similar qualities of hemp, fourteen days would be sufficient to render it proof against the effects of damp, when made up into rope.

If extract of oak bark be employed, of the usual strength, then about nine gallons of water is to be put to every pound of the extract; but if the extract be of an inferior quality, of course a less quantity of water must be used.

Yarns thus treated, the Patentee states will, when worked into ropes, be found to be much more durable, than those made in the ordinary way, and the application of tar and other resinous materials, in the making and using of the ropes will be perfectly unnecessary.—[*Inrolled in the Inrolment Office, March,* 1828]

To Robert Walter Wingfield, *of Birmingham, in the county of Warwick, brass founder, for his invention of an improvement in tubes, or rods, produced by a new method or methods of manufacturing, and in the construction of, and for manufacturing the same, with various other improvements into parts of bedsteads, and other articles.*—[Sealed 4th December, 1827.]

It is proposed to make hollow tubes of metal for bedsteads and curtain rods, and to strengthen them by the introduction of slips of wood, with bars of iron extending through the tube. The tubes in general are

formed cylindrical, but they may be square, or of any other form; the slips of wood to be inserted within, of course corresponding.

The wood intended to fill the interior of the tube may be solid, or in several strips or pieces, and these may be fastened together by pins or dowells of various kinds; or circular segments may be used with an iron bolt or bar extending through the middle of the tube.

The iron strengthening pieces may be of various shapes, and placed in different positions, either as round rods, or square bars, passed through the middle of the tube, or broad flat bars placed across in the diameter of a round tube, or diagonally in a square tube, or in any other shapes.

The ends of these tubes or rods when intended to be united for the construction of bedsteads, may be fitted together by dove tails, or by nibs and slots, or sockets, or by male and female screws, and also by other contrivances.

The particular feature of invention intended to be claimed is not set out, which is the more to be regretted, as several patents have preceded this for subjects very closely resembling it.—[*Inrolled in the Inrolment Office, June* 1828.]

[See Pratt's patent for an improved manner of combining wood and metal, so as to form rails or rods, adapted to the manufacture of bedsteads, cornices and other works, where strength and lightness are desirable, which he denominates union or compound rods, (Vol. XI, page 183, First Series of this Journal.)

To **James Deakin** *and* **Thomas Deakin**, *of Sheffield, in the county of York, merchants and manufacturers of hardware, and co-partners, for their having invented certain methods of making from horns and hoofs of animals, various articles; namely, handles and knobs of drawers and other parts of cabinet and household articles, curtain rings, bell pulls, door handles and knobs, key-hole escutcheons, or coverings for doors and window shutters, finger plates, knobs and handles; all or any of which articles are to be so made of one or more piece or pieces of horn or hoof, of any shape or device, plain or ornamental or inlaid, or conjoined with any kind of metal or other material.*—[Sealed 14th January, 1829.]

The subject of this invention is a peculiar mode of manufacturing various articles from horn or animal hoofs, such as rings for bell pulls, or handles of fancy boxes, and other articles of that description; the handles of table knives and forks, drawer knobs, and the knobs or fronts of hat pins or clothes pegs, which are to be screwed into the wainscot, or into furniture.

The Patentee describes the precise mode of making some of these articles, commencing with rings for bell pulls; next, knife and fork handles; and lastly, the knobs for drawers, and knobs or pins for other articles of furniture.

In making a ring of horn, the required piece is to be first cut out of the flat of its proper dimensions, and nearly in the shape of a horse shoe; it is then pressed in a pair of dies to give its surface the desired pattern, but previous to pressing, both the piece of horn and the dies are to be heated; the piece of horn is to be introduced

between the dies, and pressed in a vice, and when cold, the impression or pattern will be fixed upon the horn.

One particular feature however is to be observed in the construction of the dies, for forming a ring. They are to be so made, that the open ends of the horse shoe piece of horn, after being pressed, shall have at one end a nib, and at the other a recess of a dove tailed form, corresponding to each other; and the second operation in forming this ring of horn is to heat it, and place it in another pair of dies, which shall bring its open ends together, and cause the dove tailed joints to be locked fast into each other, which completes the ring, and leaves no appearance of the junction.

In forming the handles of table knives and forks, or other things which require to be made of two pieces, each of the two pieces or sides of the handle, is formed in a separate pair of dies; the one piece is made with a counter sunk groove along each side, and the other piece with corresponding leaves or projecting edges. When these two pieces are formed, by first being cut out of the flat horn, then pressed in the dies in a heated state, for the purpose of giving the pattern, the two pieces are again heated and put together, the leaves or edges of the one piece dropping into the counter sunk grooves of the other piece, and being introduced between another pair of heated dies, the joints are pressed together, and the two pieces formed into one handle.

In making the knobs for drawers which have metal stems or pins to fasten them into the furniture, the face of the knob is to be first made in a die, as above described, and then the back part of the knob with a hole in it; a metal disc of plate iron is then provided, in which the metal stem or screw pin is fixed, and the stem being passed through the aperture in the back piece, and the two—that

is the back and front pieces of horn put together, they are then heated and pressed in dies as above described; the edge of the back piece falling into the counter sunk groove of the front piece, and by the heat they are perfectly cemented together.—[*Inrolled in the Inrolment Office, March,* 1829.]

ON THE LAWS OF PATENTS.

We have been favoured with a copy of a small pamphlet, written by Mr Richard Roberts, of Manchester, on the subject of our existing Patent Laws, with his views as to the best mode of amending them. This little work contains many valuable and very judicious remarks upon this important subject; and as the pamphlet has only been privately circulated within the circle of the author's immediate friends, we have taken the liberty of making a few extracts, which we have no doubt will be acceptable to our readers.

" It is acknowledged that mechanical inventions and improvements are beneficial to the public; and as men cannot be compelled to give their inventions or improvements to the public, it is expedient to induce them to do so, by the hope of a due reward.

This reward is given in the least objectionable shape, by granting to the inventor or improver, a patent of monopoly for a limited period; at so moderate a rate of charge as may put it in the power of such parties, as are the most likely to invent or improve, to avail themselves of the monopoly.

A high rate of charge for a patent amounts in effect to a prohibition from taking out one, as it regards a large portion of those who are most likely to make discoveries: high charges, therefore, so far defeat the objects for which patents are granted; as they tend to check invention, and to cause to be withheld from the public, that which it is desirable the public should be possessed of.

No evil can arise from an increase in the number of patents taken out; because, if the discovery be worthless, the public is not injured; and if it be valuable, the greater the number of valuable discoveries made known, the more is the public benefitted.

Patentees, in general, are not likely to be over rewarded. Some few may be eminently successful; but, from the delay and expense of experiments, and from a disinclination in society to depart from established practices, a large proportion of them will either gain but little, or will even sustain loss. But, whether the Patentee be rewarded or not, the public will be benefitted, if the invention patented be a valuable one.

Patents ought to be cheap; because the granting of a patent is merely recognizing in an inventor, his property in his own invention for a limited period, on condition that he shall afterwards give the invention to the public; for without his consent, no other person can avail himself of it.

Any sum charged for a patent, beyond its actual cost to the nation, has the effect of a tax on inventions; which must be paid, whether the thing taxed be saleable or not.

Whilst patents are expensive, the men most likely to make discoveries (managers, foremen and working mechanics,) are unable to obtain them: consequently their inventions will in but comparatively few instances be made

public; and, even in those instances, it will be by the inventors sacrificing to others a large portion of their own interest, in order to secure the remainder.

The expense of making experiments, and of specifying inventions, is so great, as frequently to leave a man, after such expenditure, but little wherewith to obtain a patent: and, if he begin by taking out an expensive patent he may thereby be deprived of the means of making the requisite experiments and of specifying. In the former case, when his experiments precede the taking out of the patent, being through its high price incapaciated from securing a legal protection for his property, the invention he is obliged to abandon: whereas, under the same circumstances, a cheap patent might have put it into his power to benefit both himself and the public. In the latter case, when the taking out the patent precedes the experiments, the title of the patent gives to the public some knowledge of the invention; but, not being sufficiently matured, from want of means, it is rendered valueless both to the inventor and to the public. A dread of either of these results deters many persons from applying for patents.

Men of property, who have had experience in the results of machinery, will not often be induced to risk their money in expensive patents; knowing as they do, that, before any profit can be realized, beyond the cost of experiments and of the patent, many years generally elapse; during which time there is considerable risk of the invention being superseded.

Many valuable machines are invented, which, from various causes cannot be brought into profitable use for a great number of years Few inventors of such machines can afford to pay a high price for patents.

A cautious man will generally take a considerable time,

perhaps years, to decide whether or not he will risk the large sum now required for a patent; during which time the public loses the benefit of the invention.

Many things of a comparatively trifling nature are invented, which, were a cheap patent obtainable, would get into extensive use, and thereby benefit the public; but, when the inventor will not risk the large sum now required, the benefit of the invention is lost to the public, as well as to himself.

The early introduction of an useful invention or improvement is always of consequence to society, and therefore ought to be encouraged by the granting of cheap patents.

Patents, if cheap, would be taken out for many inventions, individually of little value; by which the Patentee might possibly sustain loss, but the public would be benefitted. Besides, many of such inventions would either suggest a new idea, or by calling the attention of mechanics to what was looked upon as desirable, be the indirect cause of a further beneficial invention or improvement. This is proved to be the case in countries where patents are cheap, as an examination of the list of patents, especially in France, will testify.

By an increase in the number of patents obtained, greater publicity would be given to the most approved machines, or modes of operation, previously in use: for, as the greater number of inventions are for improvements on old machines, or modes of operating,—and as it is requisite to describe much of the old machine or mode, in order to explain the new invention,—the public would thus become acquainted with any mechanical combinations and processes of art, which probably were previously but little known.

By the encouragement which cheap patents would

afford, many valuable inventions and discoveries would be published, through the patent office, which otherwise would either die with the inventor, or make their way to the public very slowly. The following inventions may be considered to be under this predicament.

The discovery of a principle, any practical application of which does not immediately present itself to the discoverer, or means of making which application may not be then at his command.

The discovery of a mode of producing an original screw, of greater accuracy than can be produced by any known mode.

The discovery of a mode of dividing straight lines or circles, in a more simple and accurate manner than any hitherto known.

Discoveries of this nature, notwithstanding their importance to society, could seldom be profitable to a Patentee; but still, if a patent were cheap, the discoverer would obtain one for the mere chance of remuneration; and at the same time to gratify his laudable ambition to be recorded as the inventor: and in this way, by the publication of the invention, society would be benefitted.

If a machine is intricate, and one machine, or one establishment with a given number of such machines, would be capable of supplying the demand of an extensive district; the inventor, rather than incur the risk involved in the obtaining of an expensive patent, with the view of remunerating himself by the grant of licences to use the invention, will depend upon his power to keep the invention secret, and to benefit himself by the sale of the product of the machine.

There are many inventions to which the inventor, for various reasons connected with his regular business, cannot devote the time requisite for bringing them into ope-

ration; but he would risk a small sum for a patent, if the invention afforded him reasonable hopes of remuneration by the sale of it.

If a man have a number of inventions, and if patents were cheap, he would take out a patent for each, giving to it a clear and definite title; whereas, under the present expense of patents, that cannot be afforded; and persons frequently wait until they have made several inventions, and then, that one patent may cover them all, they make out a very sweeping title. Thus the public is often deprived of the benefit of inventions for years.

An inventor often discovers, after maturing his invention, that the title is not correctly applicable to it; and in such cases, if patents were not expensive, a new patent would frequently be obtained with a title more appropriate.

The number of inventions imported would be more considerable if patents were cheap.

A Patentee will often find it impossible to make a sufficient number of experiments, to enable him to draw up a good and valid specification of his invention in time for enrolment to save his patent. In such a case, neglecting to give in any specification, he would, if he could obtain a patent for a small sum, take out a new one; unless in his former title he had already exposed too much of his invention.

Patents for Principles.

As the objects of granting patents are to benefit the public and to reward inventors, patents should be granted for all discoveries, of which the public had not any previous knowledge; for it is not reasonable to expect that persons will communicate their discoveries without some probability of being rewarded.

Many of the gentlemen who gave their evidence before the Committee of the House of Commons, in the session, 1828, were of opinion, that no patent ought to be granted for the discovery of a principle, unless the discoverer specified some mode of rendering the new principle useful to the public; and in that case, it may be presumed, they were of opinion that every application, of which the new principle should be found capable, ought to be secured to him, however inefficient his mode of applying it might be.

If such a plan be to be acted upon, it may require two distinct discoveries, the offspring of very different talent, to entitle to one patent. For instance,—a man may discover a new principle; yet, from the nature of his previous pursuits, he may be a very unlikely person to invent any apparatus, by which his new principle may be made useful to the public.

Before proceeding farther, it may be proper to observe, that the word "principle," as applied to the arts, may be defined to mean any particular law or action of nature, by which two or more bodies influence each other, to produce some certain result; or, that particular kind of action by which any thing is characterized.

New principles may be discovered by persons who do not see any useful application of them; yet, as soon as they are made known, such application is quickly made by others.

If the discovery of the magnetic principle had not been communicated, the mariner's compass might never have been invented.

If the first person who discovered that steam is capable of exerting great expansive force had obtained a patent for that discovery, and thereby given publicity to the fact, it is probable that amongst the numbers who would have attempted to render such force available for useful pur-

poses, some one would have been successful; and that the steam-engine, and many other inventions with which the force of steam is connected, would have been employed beneficially some centuries earlier.

Publication of Patents.

All specifications of patent inventions should be officially published, at as early a period after they are lodged in the patent office as their nature will admit of, in some work to be established for that purpose, which should be published, say once or twice a month. The work might be designated, " The Official Record of Patent Inventions."

The following reasons offer themselves in favour of such a mode of procedure :—

That patent inventions may be well advertised amongst the persons most interested in them.

As a trade may have a new direction given to it, or may be entirely destroyed by a new discovery or invention, extensive publication is desirable, that parties interested may regulate their future proceedings accordingly.

That parties interested may be well informed what the claims of a Patentee are ; and thus have an opportunity to set his patent aside, if he be not fairly entitled to it.

From the claims of a Patentee being extensively known, infringements would be more likely to be detected.

Much time would be saved which is at present devoted to the prosecution of supposed new inventions, but which have before been patented. There would also then be fewer instances than occur at present, of two or three patents being granted, at nearly the same time, for the same object.

Persons requiring office copies of specifications, for legal or other purposes, would be spared the great expense

which is at present incurred; and much valuable time would be saved, which is now spent in going to the office to examine specifications.

That Patentees may not be injured by the destruction of their specification, by fire or otherwise.

In specifying improvements, it is generally necessary to specify the thing improved; consequently the readers of the "Official Record," would be made acquainted with the old machines, or other matters, as well as with the improvements.

Defective Specifications.

Much has been said before the Committee of the House of Commons, about defective specifications being lodged by Patentees, who were desirous of concealing from the public the real nature of their discoveries.

With respect to *mechanical* inventions, it does not seem probable that many persons will attempt such concealment, since the invention is of necessity exposed by the sale of the first machine.

In *chemical* discoveries, the case may be different; and if some mode of inducing a Patentee to amend his defective specification could be devised, without introducing a greater evil than now exists from an occasional defective specification, perhaps it would be desirable to adopt it. But nothing would tend more to put a Patentee on his guard against making a defective specification, of either a mechanical invention or chemical discovery, than the knowledge, that his own workmen or others may become aware of and expose those defects, whenever his specification is published in the manner recommended.

APPENDIX

To the Report of the Select Committee of the House of Commons, on Patents.

Papers delivered in by John Farey, Esq.

[British Law of Patents for Inventions.]

(continued from p. 299.)

ORDERS of the House of Commons, 26 May 1685, respecting the Petition to the House of Commons, for leave to bring in a Bill to extend the terms of Letters Patent. By Order 13 May 1690, the Petition must truly state the case, and must be signed by the parties who are suitors for the Bill; a copy of the Patent must be annexed to the Bill. And, by another Order 24 November 1699, the Petition must set forth the suggestions and reasons.—See also Orders 30 June 1801, and House of Lords, 20 March 1808.

An Act for encouraging the distilling Brandy, and Spirits, from Corn, and for laying several Duties on low Wines or Spirits of the first extraction. Sect. 13. All charters and letters patent already, or hereafter to be made, for the sole making of brandy, spirits, or strong waters, from corn, of any sort, or in any manner whatsoever, as a new invention, or whereby the power given by this Act (to all persons to distill brandy, spirits or strong waters, from corn) shall be in any manner restrained, shall be void.—1690. 2 W. & M. sess. 2, c. 9.

An Act for the better encouragement of the Royal Lustring Company, Section 13. In the 4th James II, 1688, a patent was granted for a new invention of making, dressing and lustrating silks, called Black á-la-modes, and Lustrings, for fourteen years; and by a royal charter, 4th of W. & M. the Royal Lustring Company was incorporated; that Company have brought the said manufacture to perfection, and as the same cannot be so well carried on as by a Company, they are continued as a body corporate by this Act, as fully as if the said royal charter had been recited at large. The Act grants them the sole benefit of making, dressing, and lustrating the above silks in England, for fourteen years, from the 24th June 1698.—1698, 9 and 10 W. 3, c. 43.

An Act for the encouragement of a new invention, by Thomas Savery, for raising Water, and occasioning motion to all sorts of Mill-work, by the impellent force of fire. Mr. Savery had obtained a patent, dated 25th July 1698, for his invention, " which will be of great use and advantage for drainiug mines, " serving towns with water, and for the working of all sorts

of mills, where they have not the benefit of water, nor constant winds." This was an important invention in its time, being the first steam engine which was brought to bear in real business, but it was soon superseded by Mr. Newcommen's fire engine, invented in 1710. It does not appear that Newcommen obtained any such Act, but it has been said that he was obliged to come to an agreement with Savery, and work under his patent, and this Act.—1699. 10 & 11 W. 3. c. 31, of private Acts.

An Act to enable the Trinity House to levy Rates on Ships, for rebuilding the Lighthouse on Edystone rocks. Explained in 1709, by 8 Anne, c. 17. The difficulty of this undertaking and its great importance to navigation, renders it worthy of a place amongst inventions. The first lighthouse on Edystone was built of stone by Mr. Winstanley, and first used in 1698; he lost his life in it, when it was overthrown during a violent storm in 1703. Another house was built in its place, of wood, under this Act, by Mr. Rudyerd, and finished in 1709; it was detroyed by fire in 1755.

The present lighthouse was built in stone by Mr. Smeaton, and finished in 1759. Mr. Winstanley having expended all his property in the building, left his family destitute; a pension of 100*l*. a year for life, was granted to his widow.—1705. 4 Anne, c. 20.

An Act for the exportation of white Woollen Cloth, before being dressed. This exportation had been prohibited in 1522, by 14 & 15 Hen. 8, c. 3; but in 1562, Queen Elizabeth, in her sixth year, granted a patent to the Hamborough Company, with liberty to export 30,000 cloths, not wrought or dressed. Also, in 1676, Charles the Second, in his 28th year, granted a patent to Sir James Hayes, and Sir Peter Apsley, Knights, in trust for the Countess of Portland, for twenty-one years, to license the exportation of all kinds of woollen cloths, white, or coloured, though not dressed. At the expiration of that patent in 1707, the exportation of white cloths was stopped, and in consequence this Act was passed to permit the exportation. Another Act was also passed, at the same time, 6th Anne, c. 8, to impose a duty of five shillings upon the export of every white cloth, in order to encourage the dyeing and dressing of such cloths in England.—1707. 6 Anne, c. 99.

An Act for preserving the Copy-right of printed Books to the Authors of the same. For the encouragement of learned men to write useful books; the author of any book or his assigns, shall have the sole liberty of printing and reprinting such book, for fourteen years from the first publishing the same; and no other person shall print the same under a penalty. The title to the copy-right of such book must be entered before publication, in the register book of the Company of Stationers,

and nine copies of the book must be delivered to that Company, for public libraries. The price of books, if unreasonable, to be regulated by the Archbishop of Canterbury, or the Lord Chancellor, or other officers named.—1709. 8 Anne, c. 19. Extended to 28 years by 54 Geo. III. c. 156. See also 7 Geo. II. c. 24

An Act for providing a public Reward for such person or persons as shall discover methods of finding the Longitude at Sea. See also 26 Geo. 2; 2 Geo. 3; 3 Geo. 3; 5 Geo. 3; 10 Geo. 3; 14 Geo. 3. Methods having been already discovered which are thought true in theory, but which are difficult in practice, and require expensive experiments to bring them to bear, Commissioners are appointed to receive and examine proposals for means of discovering the longitude, and to grant money for making experiments on such plans as they judge fit; the expense not to exceed 2,000*l.* The first discoverer of a proper method of finding the longitude in ships at sea, if true within a degree of a great circle, shall be entitled to a reward of 10,000*l.* if within two-thirds of a degree, 15,000*l.* and if within half a degree, 20,000*l.* Half the reward to be paid when the majority of the Commissioners do agree that the method extends security to ships at eighty miles from shore; and the other half when a ship shall sail over the ocean, from Great Britain to the West Indies, without losing the longitude beyond the said limits. If the method shall not be found, on trial, to be of so great use as to be within the said limits, but if the Commissioners think it is of considerable use, they may order such part of the reward as they see fit.

The results of this and other subsequent Acts have been most important to the success of navigation. Mr. John Harrison was induced to set about time-keepers or watches, which he invented and made in succession, in 1726, 1736, 1739, and 1761; he was rewarded with 1,200*l.* in 1753, 3,803*l.* in 1762, 5,000*l.* in 1765, and 10,000*l.* in 1773; making the whole reward of 20,000*l.* Also Mr. Whiston, M. Euler, Mayer, Bird, Ramsden, Mudge, Arnold, Earnshaw, and others, have been rewarded for instruments and methods; and the Nautical Almanack and Tables have been published annually since 1766, whereby navigation has been brought to a high degree of perfection.

Note respecting the origin of enrolling Specifications of Patent Inventions.—Near the end of the reign of Queen Anne it became the custom to insert a proviso into all patents, to oblige the patentee to execute a complete specification of the invention for which the patent was granted, and also to inroll the same in the Court of Chancery, within a specified time after the date of the patent. Before that time, the patentee was not called upon for any specification; Mr. Savery's patent

of 1698 has no such clause. The inconveniences of giving the patentee a privilege, without defining the object to which it extended, are obvious; nor could the public have had any security for obtaining the invention at the expiration of the patent. The authority by which this clause was introduced does not appear. It was not a Parliamentary measure. When Parliament gave a reward to Sir Thomas Lombe, in 1732, for silk machinery, a model was deposited in the Tower of London, where it still remains.—1713. 12 A. stat. 2, c. 15.

An Act for providing a recompense to Sir Thomas Lombe, for discovering and introducing the Arts of making and working three Italian engines, (one to wind raw Silk, another to spin, and another for twisting Organzine Silk,) and for preserving the invention for the benefit of the kingdom. Thomas Lombe, afterwards Sir Thomas, brought the invention from Sardinia into England, and had a patent for it in 1718. He established a large silk mill at Derby, but not having made profit, (chiefly because the King of Sardinia prohibited the exportation of raw silk,) Parliament granted him 14,000*l.* reward; and models of the machinery were deposited in the Tower of London. Before the introduction of this invention, all the thrown Silk used in England was bought of the Italians. The invention does not appear to have been very new or secret, for it is described, with engravings, in an Italian book, Novo Teatro di Machine, by Vittorio Zonca, 1656; but nevertheless the real application to use, must have been a great undertaking.

The trade founded on this beginning, did not prove very extensive or very beneficial to the nation, for want of an adequate supply of raw material. The importation of foreign thrown silk had been discouraged in 1690 by 2 Wm. and Mary, sess. 1. c. 9.; and notwithstanding Sir Thomas Lombe's mills at Derby, and others, it was found necessary in 1757, to permit a more free importation of Italian organzined silk for a time, by 30 Geo. II. c. 17; and again in 1779, by 19 Geo. III. c. 9; and since by other Acts.—1732. 5 Geo. II. c. 8.

An Act for providing a reward to Johanna Stephens, of Westminster, Spinster, upon a proper discovery to be made by her, for the use of the public, of the Medicines, prepared by her, for removing the cause of the Stone. 5,000*l.* reward was to be paid to Mrs. Stephens for her discovery, if the Commissioners appointed by the Act should on examination be convinced of its efficacy. There is no condition of enrolling any specification, nor is it easy to find now, what the medicine was.—1739. 12 Geo. II. c. 23.

An Act for surveying the principal Ports, Points, and Head Lands, on the coast of Great Britain, and for determining their Latitudes and Longitudes. The Commissioners appointed by

12th Anne, are empowered to apply to that purpose part of the 2,000*l.* placed at their disposal, for promoting means of finding the longitude at sea—1741. 14 Geo. II. c. 39.

An Act (amongst other things) allowing a drawback of the duties upon Coals used in fire engines, for draining Tin and Copper mines, in Cornwall. Newcomen's steam engine was by this time brought into very extensive use.—1741. 14 Geo. II. c. 41.

An Act for vesting in John Elwick, Esq. the sole property of an engine for making Stone Pipes, and to enlarge the term of a Patent granted for that purpose to John Tuite in 1734. The undertaking stood still until Mr. Elwick purchased the patent right, and had at many thousand pounds expense, improved the engine beyond what it was capable of doing when first invented. The Patent was declared valid, and an additional 14 years was granted. This invention has not succeeded. It was revived under patents in 1805 by Sir George Wright, and again in 1810, by Mr. Murdock. A Company was then established, and they made a large quantity of stone pipes for the waterworks in Manchester and some in London, but they did not answer, and were taken up.—1743. 16 Geo. II c. 25. of Private Acts.

An Act for securing the sole property of an Engine invented by Israel Pownoll, deceased, for raising ballast, sullage and sand, and for removing banks, shelves and shoals in rivers and harbours, to the children of the said Israel Pownoll, for 14 years, from the 1st. August, 1750. I. Pownoll had a patent in 1712, and completed the engine before his death, but afterwards his children, being young, could not work it; and the patent being expired, it was not likely to be brought into use without a new grant, which was therefore made by this Act.

This engine has proved a very important invention in modern times, since it has been wrought with sufficient power by the steam engine. Most of the rivers and harbours in Britain have been greatly improved by means of such dredging engines, which are now quite common here, and many have been made to send abroad.—1749. 23 Geo. II. ch. 33. of Private Acts.

An Act to encourage the importation of Pig and Bar Iron from the Colonies in America, and to prevent the erection of any Mills for slitting or rolling of iron, or any plating forge to work with a tilt hammer, or any furnace for making steel, in any of the said Colonies.—1750. 23 Geo. 2. c. 29.

An Act for vesting for a time in Michael Meinzies, Esq. the sole property of a Machine by him invented for conveying of Coals from the places where they are dug, to the heaps at the mouths of the pits; and in some cases from the heaps to the staiths where they are put on board ships or keels; also a new method of drawing up coals out of the pits or shafts. The

inventor, who was an Advocate in Scotland, had obtained patents in 1750, for England and for Scotland; and having incurred a great expense, was not likely to be sufficiently recompensed by the term of 14 years in the patent rights. An addition of 14 years was therefore made to the term of each patent.—1751. 24 Geo. II. c. 28. of Private Acts.

An Act to render more effectual an Act (12 Anne) providing a reward for discovering methods of finding the Longitude at sea. It is stated, that under the Acts 12 Anne and 14 Geo. II. the Commissioners had paid 1,200*l.* to John Harrison, to enable him to make his watch, and also 500*l.* to William Whiston for surveying the coasts of Britain; and having then only 250*l.* left at their disposal, for making experiments and surveys, they are allowed 2,000*l.* more for pursuing the same objects.—1753. 26 Geo. II. c. 25.

An Act to enable Francis Duke of Bridgewater, to make a navigable Canal &c. Also 33 Geo. II. c. 2. priv. and 1761. 2 Geo. III. c. 11. priv. This deserves particular notice, as being the commencement of the series of canals, which have since proved so advantageous to the nation, and also as involving many points of new invention. The Duke expended all his fortune before he completed the Canal in 1776, but it has been very profitable since. The works were executed under the direction of Mr. James Brindley.—1758. 32 Geo. II. c. 2. of Private Acts.

An Act for rendering more effectual the Act (12 Anne) for rewarding the discovery of the methods of finding the Longitude at sea. The Commissioners having expended the whole of the money placed at their disposal (by 12 Anne; 14 Geo. II.; and 26 Geo. II.) a farther 2,000*l.* was granted for pursuing the same objects.—1761. 2 Geo. III. c. 18.

An Act for the encouragement of John Harrison, to publish and make known his invention of a machine or watch for the discovery of the Longitude at sea. Upon disclosure of the principles of his Watch, and the method of making the same to the satisfaction of the Commissioners, they are to award him 5,000*l.* to be paid so soon as the said instrument shall by future trials appear to be a proper method of finding the longitude, within the limits prescribed by the 12 Anne, c. 15. No person to be entitled to a reward under the said Act, for any timekeeper, until the merits of Harrison's watch be ascertained.

Note—Mr. Harrison's watch had been tried in a voyage to Jamaica and back in 1762. It found the longitude very exactly. The principles of his Timekeeper were published in 1767. London, quarto. 1762. 2 Geo. III. c. 14.

An Act for explaining and rendering more effectual two Acts, 12 Anne and 26 Geo. II. concerning the means of finding the Longitude at sea. The Commissioners had advanced money to

John Harrison, to enable him to make three watches, and to purchase the same of him; and on trial of one of his watches on a voyage to Jamaica, (in 1762) ordered him 2,500*l.* reward. On further trial of the same watch (in 1764) in a ship from Portsmouth to Bridgetown in Barbadoes, it did not lose its longitude beyond ten geographical miles. Also lunar tables have been constructed by the late Tobias Mayer of Goetingen in Germany, on the principles of Sir Isaac Newton, and by the aid of theorems by Professor Euler of Berlin, which tables will be of use to the public for finding the longitude.

This Act directs 7,500*l.* more to reward John Harrison, provided he explains his principles within six months, and gives up his three watches. The other half of the greatest reward offered by 12 Anne, to be paid to him, when timekeepers shall be made on his plan, by other persons, to determine the longitude within half a degree. It also awards a sum not exceeding 300*l.* to Euler; and a sum not exceeding 3,000*l.* to the widow of Tobias Mayer, for the latest manuscript of her husband's tables; and the Commissioners may give a sum not exceeding 5,000*l.* to persons who shall improve the tables of the moon. Also the Commissioners are directed to undertake the construction and printing of the nautical almanack annually, and such other tables as will be useful; no other persons allowed to print or publish their tables, under a penalty.

Note.—In 1767, the Commissioners gave a reward of 560*l.* to Mr. John Bird, for disclosing his method of dividing astronomical quadrants, which was more perfect than any before known.—1765. 5 Geo. III. c. 20.

An Act for rendering more effectual several Acts for providing a public Reward for discovering means of finding the Longitude at sea; for improving Mayer's Lunar Tables; and encouraging improvements useful to Navigation. The sums placed at the disposal of the Commissioners, being expended in experiments, &c. a further sum not exceeding 5,000*l.* was granted for the same objects.—1770. 10 Geo. 3. c. 34.

An Act incorporating the Company of British Cast Plate Glass Manufacturers, for the purpose of establishing one or more glass manufactories, for casting large plate glass on an improved plan, to remain in force 21 years. This has since grown up to a great trade, but the machinery and process have been kept very secret, and are very little known. The term has been renewed from time to time by other Acts.—1773. 13 Geo. III. c. 38.

An Act for granting to His Majesty a certain sum of money out of the Sinking Fund, &c.; and for paying to John Harrison, a further reward for his invention of a Time-keeper, for ascertaining the Longitude at sea; and his making discovery of the

principles upon which the same was constructed. By section 24 of this Act 2,000*l.* was granted to Dr. Richard Williams, for his invention of fast green and yellow dyes for cotton yarn and thread. And by § 29, a reward not exceeding 8,750*l.* was to be paid to Mr. Harrison, for his invention of a Time-keeper, &c.

A description concerning such mechanism as will afford a nice and true mensuration of time, was published by Mr. Harrison in 1775. The description of his former Watch was published in 1767.—1773. 13 Geo. III. c. 77.

An Act repealing all former Acts concerning means of finding the Longitude at sea, (except as to the Commissioners, and to their publishing nautical almanacks and tables); and for the encouragement and reward of persons discovering methods for finding the Longitude at sea, and useful discoveries in Navigation; and for the better making experiments relating thereto. The first discoverer of a method which will determine the longitude to within a degree of a great circle, to have 5,000*l.* reward; if to within two-thirds of a degree, 7,500*l.*; and if within half a degree, 10,000. If it is by means of a time-keeper (the principles of which have not been made public,) the reward to be due, when two or more time-keepers of the same construction shall have been tried for twelve months at the Royal Observatory, and then in two voyages round Great Britain in contrary directions, (or such other voyages in different climates as the Commissioners shall direct) and after returning therefrom, to be tried again at the Observatory for any time, not exceeding twelve months; and when the Commissioners are satisfied that such method will determine the longitude to within the above limits, in all voyages of six months duration; and when the principles of the construction are fully explained to the satisfaction of the Commissioners and the time-keepers assigned to them.

If the method is by improved solar and lunar tables, 5,000*l.* reward if they will determine the longitude to within seven minutes; that reward to be due after that exactitude has been proved, by comparison with astronomical observations, and after the property of the tables is assigned to the Commissioners.

A further sum, not exceeding 5,000*l.* is placed at the disposal of the Commissioners, to pay debts incurred, for services for improving navigation; and for continuing the same course of experiments and observations.

(To be continued.)

New Patents Sealed, in 1831.

To Robert Winch, of Gunpowder Alley, Shoe Lane, in the city of London, printer's joiner, for his having invented certain improvements in printing machines.—Sealed 29th January, 6 months.

To Joshua Bates, of Bishopsgate Street Within, in the city of London, Esq. in consequence of a communication made to him by a foreigner residing abroad, for certain improvements in refining and clarifying sugar.—31st. January, 6 months.

To John Charles Schwieso, of Regent Street, in the county of Middlesex, musical instrument maker, for his having invented certain improvements on piano fortes and other stringed instruments.—2d February, 6 months.

To William Sumner, of Hose, in the county of Leicester, lace maker, for his having invented or found out certain improvements in machinery for making lace, commonly called bobbin net.—3d February, 6 months.

To George Gorham Gardner, of New York, but now residing at Threadneedle Street, in the city of London, Gentleman, in consequence of a communication made to him by a foreigner residing abroad, for an invention of an improved roving machine.—11th February, 6 months.

To William Westley Richards, of Birmingham, in the county of Warwick, gun maker, for his having invented or discovered certain improvements in the touch holes and primers, suitable to percussion guns, pistols, and all sorts of fire arms fired upon that principle.—11th February, 2 months.

To John Gunby, of George Street Sand Pitts, Birmingham, artist, for his having invented an improved method or methods of combining glass with metal, metals, or other substances, applicable to various useful and ornamental purposes.—11th February, 2 months.

To Claude Guilotte, of Crispin Street, Spitalfields, in the county of Middlesex, machine maker, in consequence of a communication made to him by a foreigner residing abroad, for an improvement in the rack applicable to the battons of looms, or machinery for weaving plain or figured ribbons.—11th February, 6 months.

To William Morgan, of York Terrace, Regent's Park, Esq. for his having invented certain improvements in steam engines.—14th February, 6 months.

To James Thompson, of Spencer Street, Goswell Street Road, in the county of Middlesex, Gentleman, for his having invented certain improvements in making or producing printing types.—14th February, 6 months.

To Thomas Bailey, of Leicester, in the county of Leicester, frame smith, and Charles Bailey, of the same place, frame smith, for their having invented or found out certain improvements in machinery for making lace, commonly called bobbin net.—15th February, 6 months.

To William Payne, of New Bond Street, in the parish of Saint George, Hanover Square, in the county of Middlesex, watch and clock maker, for his having invented an improved pedometer for the waistcoat pocket, upon a new and very simple construction.—15th February, 2 months.

CELESTIAL PHENOMENA, for March, 1831.

D.	H.	M.	S.	
1	0	0	0	Clock before the ☉ 12 *m.* 43 Sec.
4	7	0	0	☾ in conj. with γ in Libra
4	12	0	0	☿ in conj. with γ in Capri
4	18	0	0	☾ in conj. with ψ in Libra
5	0	0	0	Clock before the ☉ 11 *m.* 52 Sec.
5	11	0	0	☾ in conj. with φ in Oph
5	17	0	0	☿ in conj. with δ in Capri
5	21	0	0	♄ in conj. with ε in Leo
6	5	11	0	☾ in □ last quarter
8	18	0	0	☾ in conj. with *d* in Sagitt
10	0	0	0	Clock before the ☉ 10 *m.* 39 Sec.
12	16	0	0	♃ in conj. with ♅ in Capri
12	18	0	0	☽ in conj. with λ in Aquarius
13	17	49	0	Eclip. conj. or ● new moon
15	0	0	0	Clock before the ☉ 9 *m.* 17 Sec.
15	20	0	0	☽ in conj. with ν in Pisces
16	16	0	0	☽ in conj. with 2 ξ in Ceti
16	23	0	0	☽ in conj. with μ in Ceti
17	30	0	0	♀ in conj. with 1 ζ in Pisces
17	11	13	0	♂ in conj. with *A* in Tarus ♂ 07' *S*
17	18	0	0	☽ in conj. with *f* in Taurus
18	14	0	0	☽ in conj. with γ in Taurus
18	16	0	0	☽ in conj. with 1 δ in Taurus
18	16	0	0	☽ in conj with 2 δ in Taurus
18	21	0	0	☽ in conj. with α in Taurus
20	0	0	0	Clock before the ☉ 7 *m.* 49 Sec.
20	5	0	0	☿ in conj. with φ in Aquarius
20	7	0	0	♃ in conj. with ♅ long. 12° in Cap. ♃ lat. 17° 28' S. ♅ lat. 17° 30' S. diff. of lat. 2'
20	10	17	0	☽ in □ first quarter
20	20	21	0	☉ enters Aries
24	6	0	0	♀ in conj. with ο in Pisces
24	18	0	0	☽ in conj. with α in Leo
25	0	0	0	Clock before the ☉ 6 *m.* 18 Sec.
25	3	0	0	♂ in conj. with 2 η in Taurus
25	6	0	0	in conj. with ξ in Leo
26	5	0	0	in conj. with σ in Leo
27	20	21	0	Ecliptic opposition or ○ full moon
27	22	0	0	☾ in conj. with 1 γ in Virgo
30	0	0	0	Clock before the ☉ 4 *m.* 44 Sec.
31	15	0	0	in conj. with γ in Libra

The waxing moon ☽.—the waning moon ☾

METEOROLOGICAL JOURNAL, for Dec. and Jan. 1831.

1830.	Therom.		Barometer.		Rain in inches	1830.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
Nov.											
26	32	19	29,26	29,22		11	35	29	30,02	30,00	
27	32	20	29,16	Stat.		12	39	27	30,00	stat.	
28	36	26	29,36	29,00		13	38	30	30,04	30,02	
29	33	20	29,61	Stat.		14	40	30	30,08	stat.	
30	42	20	29,52	29,22		15	33	28	29,94	29,82	
31	46	36	29,56	29,14	,5	16	34	27	29,76	29,73	
Jan.											
1	38	25	29,80	29,67		17	43	30	29,59	29,54	,1
2	41	25	29,79	29,76		18	46	31	29,56	29,52	
3	38	30	29,83	stat.		19	47	33	29,61	29,59	,175
4	39	28	29,78	29,77		20	44	39	29,41	29,28	
5	42	35	29,86	29,77		21	48	37	29,15	29,14	,2
6	38	28	30,30	30,10		22	50	39	29,22	29,16	,2
7	34	21	30,49	30,46		23	47	38	29,40	29,25	,15
8	33	16	30,50	30,38		24	34	30	29,51	29,42	,15
9	45	18	30,22	30,00		25	33	25	29,88	29,79	
10	41	24	29,86	29,84							

Edmonton. *Charles Henry Adams.*

METEOROLOGICAL JOURNAL,

For Jan. and Feb. 1831.

1831.	Thermo.		Barometer.		Rain in inches.	1831.	Thermo.		Barometer.		Rain in inches.
	Hig.	Low	High.	Low.			Hig.	Low	Hig.	Low.	
JAN. 26	32	21	30,09	30,00		Feb. 12	55	42	30,21	30,18	,05
27	37	20	29,92	29,36		13	49	42	30,16	30,11	,025
28	33	25	29,61	Stat.		14	48	40	30,15	30,13	
29	35	27	29,81	Stat.		15	47	36	30,06	29,90	
30	33	17	29,76	29,72		16	50	35	29,93	29,76	,15
31	34	17	29,68	29,52		17	48	34	30,06	29,82	,05
Feb. 1	35	23	29,16	29,09	8,	18	48	32	30,11	stat.	
2	39	25	29,16	29,13		19	49	32	29,99	29,96	,05
3	37	10	29,36	29,14	,425	20	40	34	29,86	stat.	,125
4	39	34	29,33	29,00	2,	21	43	29	29,98	29,94	
5	39	31	29,83	29,53	,125	22	41	30	30,18	30,01	
6	38	21	29,84	29,60		23	43	28	30,30	30,25	,025
7	51	30	29,66	29,46	,35	24	49	26	30,11	30,01	
8	54	45	29,86	29,82		25	45	39	29,76	29,73	,05
9	62	50	30,05	29,89	,05						
10	57	43	30,15	30,11							
11	55	42	30,18	30,13							

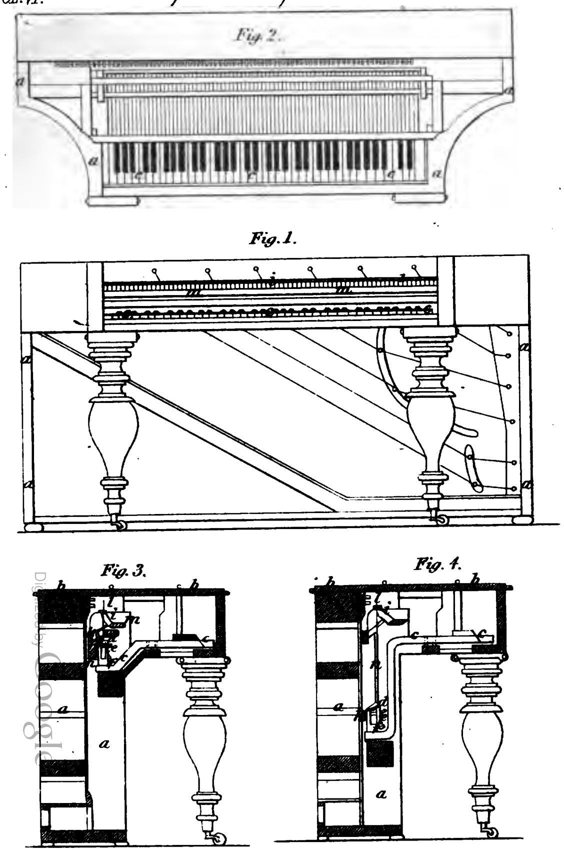
Edmonton. *Charles Henry Adams.*

GENERAL ACCOUNT FOR THE PAST YEAR, 1830.

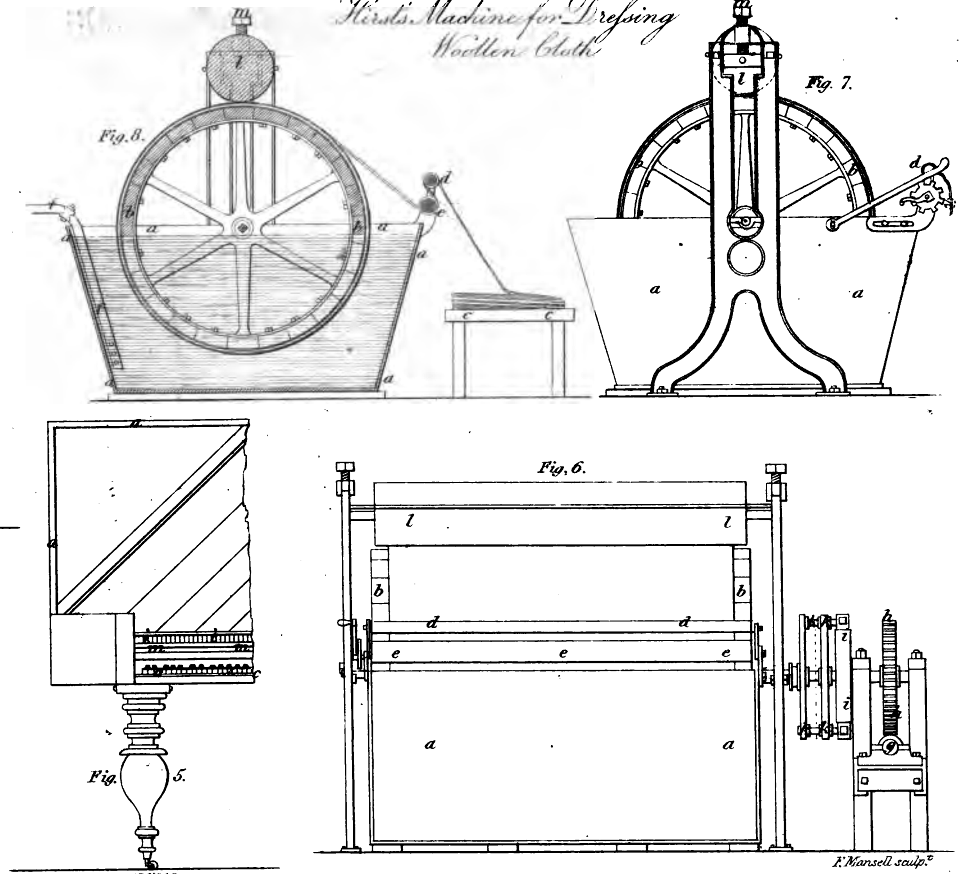
(Kept at Edmonton.)

	Thermometer.				Barometer.				Rain.	Winds.							
Month.	Highest	Lowest	Mean.	Range	Highest	Lowest	Mean.	Range	In Inches	N	S	E	W	N E	S E	N W	S W
January	43	5	30,14	38	30,52	28,59	30,2221	1,93	1,375	3				16½	2½	5½	3½
February	56	2	33,8	54	30,26	29,36	30,4799	,90	1,55	1	½		5½	6		3	12
March	70	24	45,82	46	30,50	29,36	30,0205	1,14	,225			2½		5	1½	4	18
April	73	19	48,52	54	30,14	29,16	29,7288	,98	2,675			1	1	2	3	3½	19½
May	80	30	55,1	50	30,21	29,34	29,8226	,87	2,6	½		1	2	3½	7½	5	11½
June	76	36	56,76	40	30,06	29,39	29,7456	,67	3,130	3		2½	1½	3½	2	6	11½
July	84	41	63,66	43	30,29	29,41	29,8509	,88	1,4	½	1	1½	1½	2½	3	1	20
August	75	33	59,25	42	30,16	29,36	29,8403	,80	2,65					2	2	7	20
September	69	35	54,4	34	30,28	29,22	29,5203	1,06	3,0	2	1		1			5	21
October	69	27	51,75	42	30,44	29,64	30,1462	,80	,650			1		7	2½	7½	13
November	60	23	44,17	37	30,33	29,08	29,7747	1,25	3,275					2	6	1½	20½
December	49	8,5	35,18	40,5	30,26	28,90	29,5530	1,36	1,325	1		3	1	4½	5½	11½	4½
Year.	84	2	48,21	82	30,52	28,59	29,8930	1,93	23,855	11	2½	12½	13½	54½	35½	60½	175

Thompson's Imp.d Piano Forte.



Hirst's Machine for Dressing Woollen Cloth



W. Newton del.t Oct.r 1st 1830. F. Mansell sculp.t

Taylor's Imp^d. Machinery for Dressing Flax.

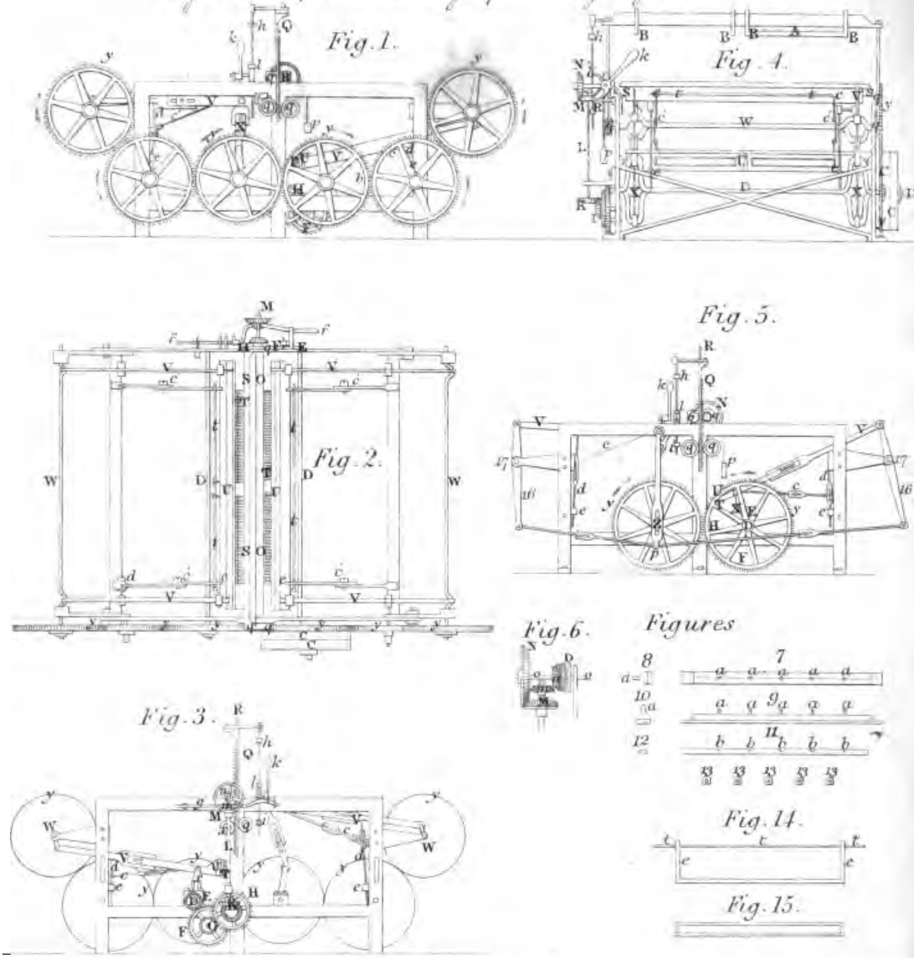


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6. Figures 7, 8, 9, 10, 11, 12, 13. Fig. 14. Fig. 15.

Bush's Calico Printing Apparatus

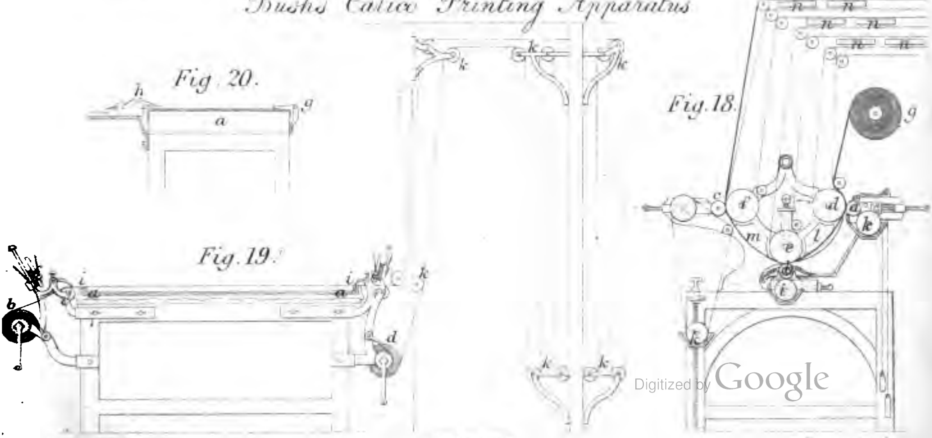


Fig. 18. Fig. 19. Fig. 20.

Nicholls's Power Lever.

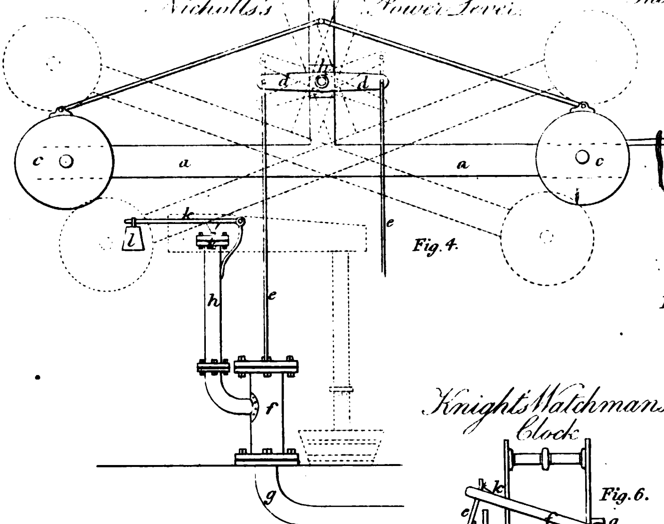


Fig. 4.

Shalder's impd Pump

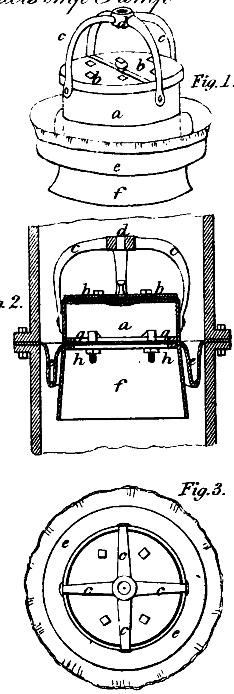


Fig. 1. Fig. 2. Fig. 3.

Knight's Watchman's Clock

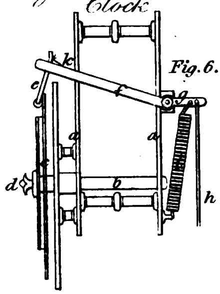


Fig. 6.

Wright's Window fastener.

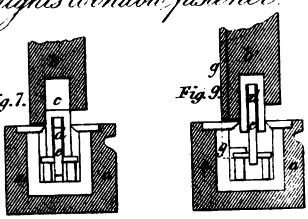


Fig. 7. Fig. 9.

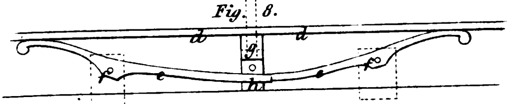


Fig. 8.

Phillips's impd Capstan.

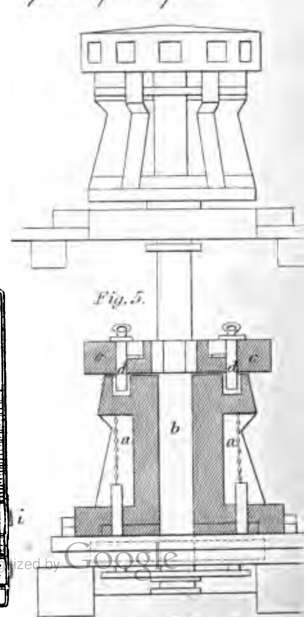


Fig. 5.

Galloway's Steam boiler.

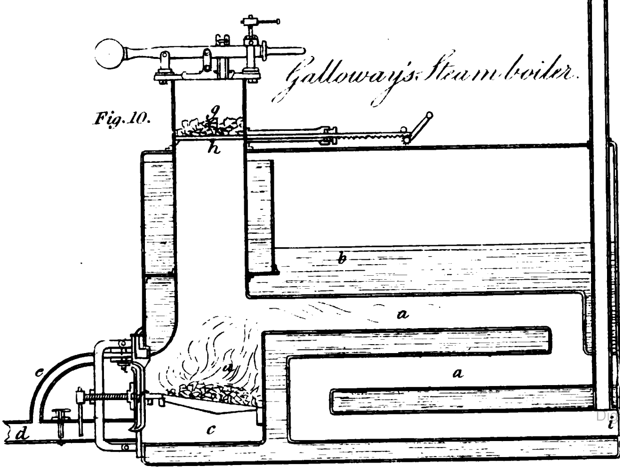
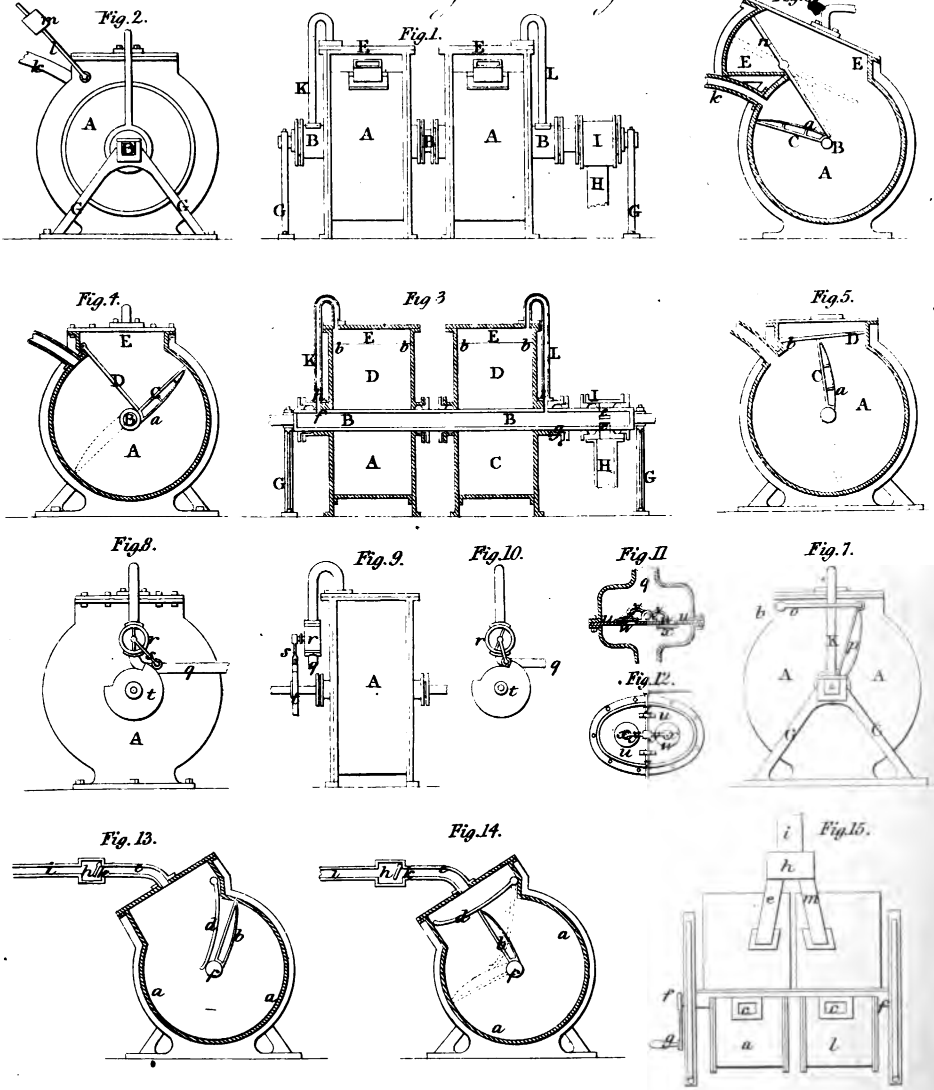
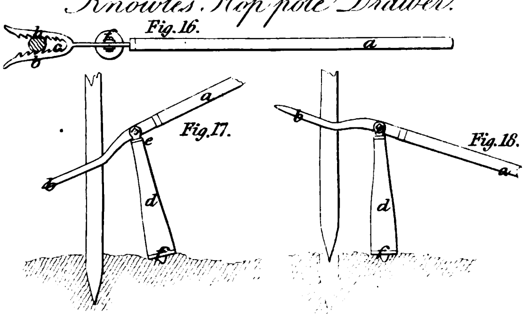


Fig. 10.

Street's Rotatory Steam Engine



Knowle's Hop-pole Drawer.



Reid's Power Loom.

W. Newton del.t 1st Nov. 1830. G. Gladwin sc.

SECOND SERIES.

Vol. VI. PLATE V.

Prosser's Impd. Window Sashes.

Fig. 1. Fig. 2. Fig. 8. Fig. 5. Fig. 6.

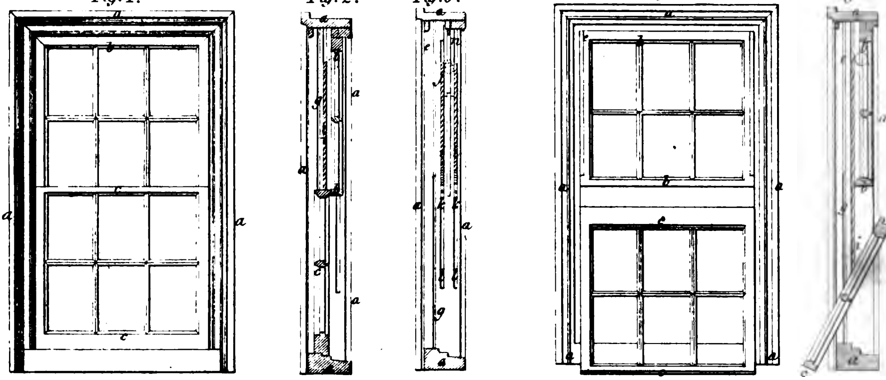
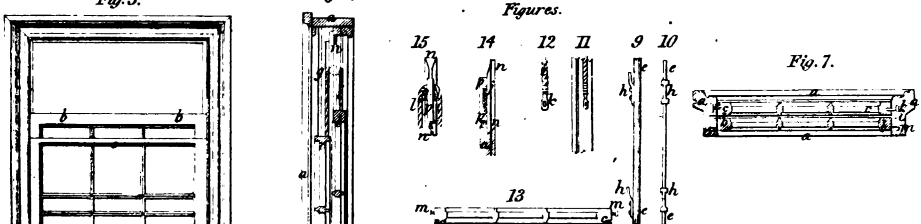


Fig. 3. Fig. 4. Figures. Fig. 7.



Pinkus's Impts. in the generation of gas.

Fig. 19. Fig. 20.

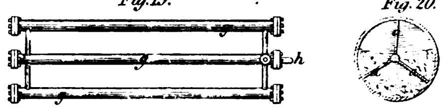
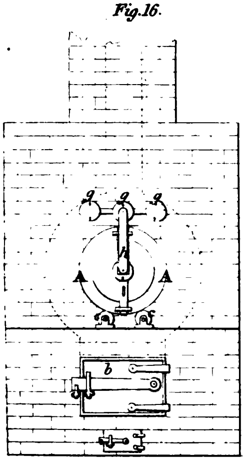
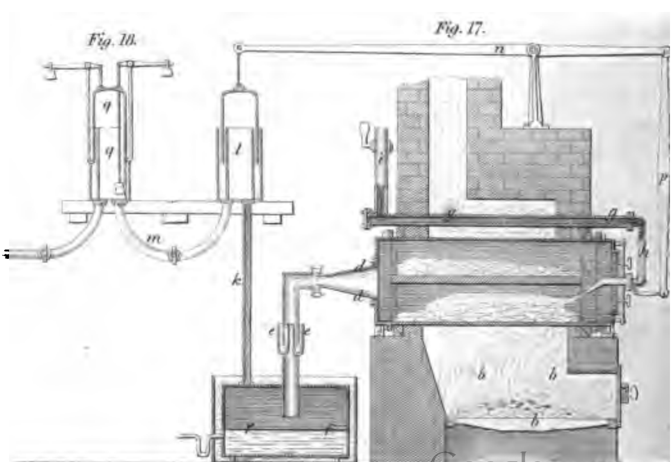


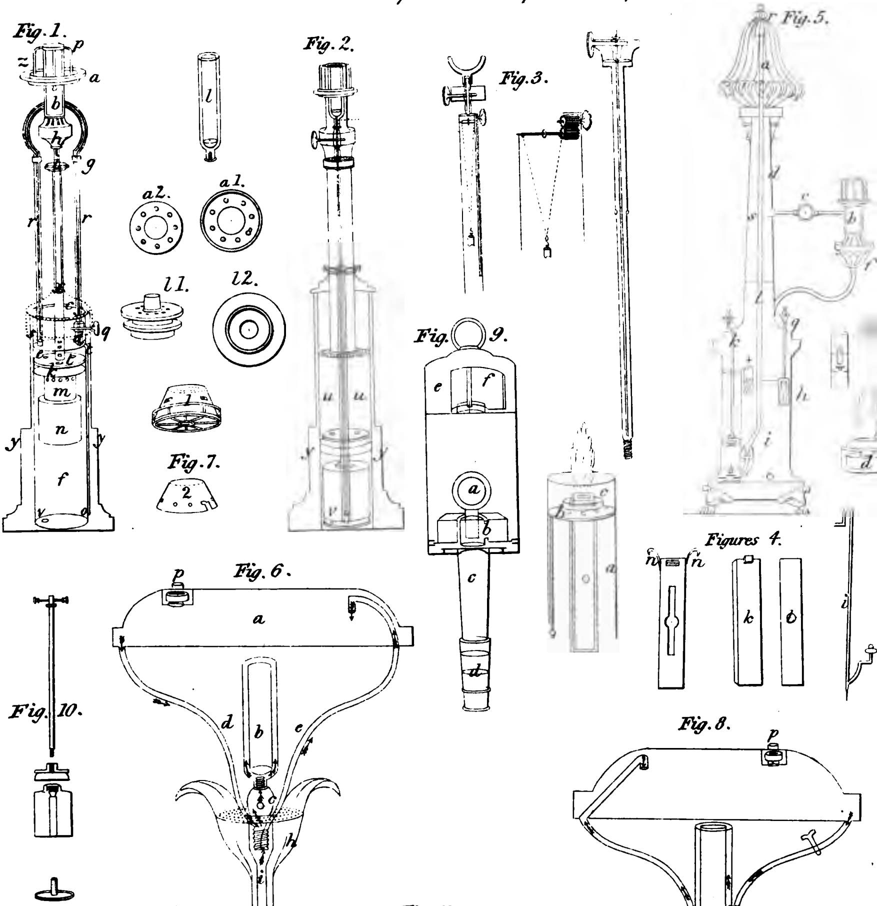
Fig. 16.



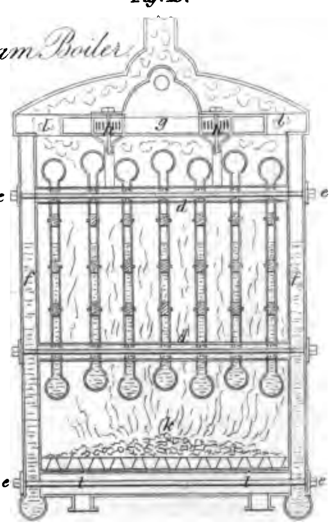


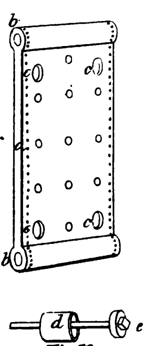
1st Decr. 1830.

Roberts's & Upton's Impd. Lamp.

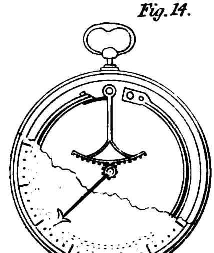


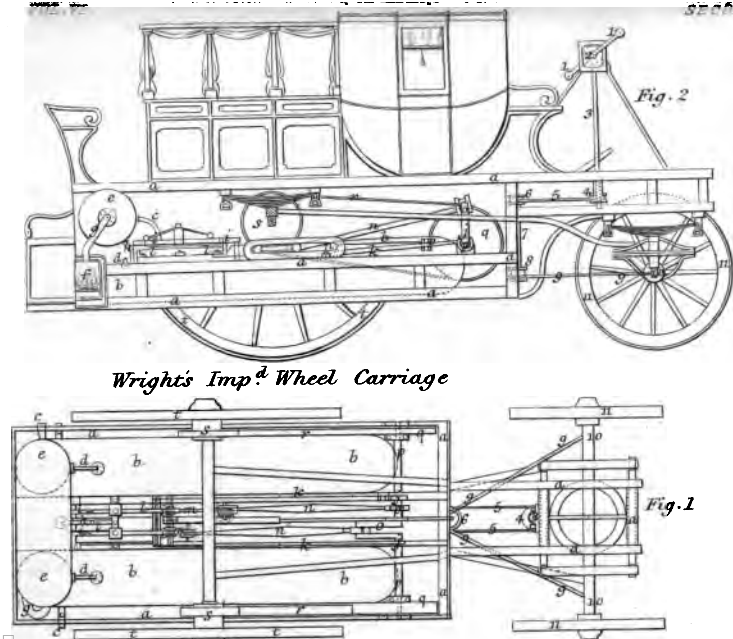
Hancock's Steam Boiler



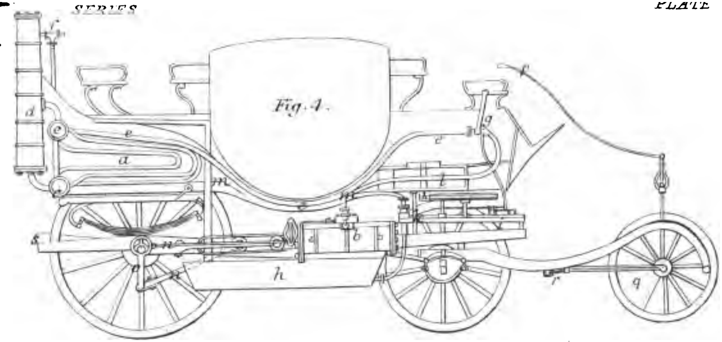


Impd. Thermometer.

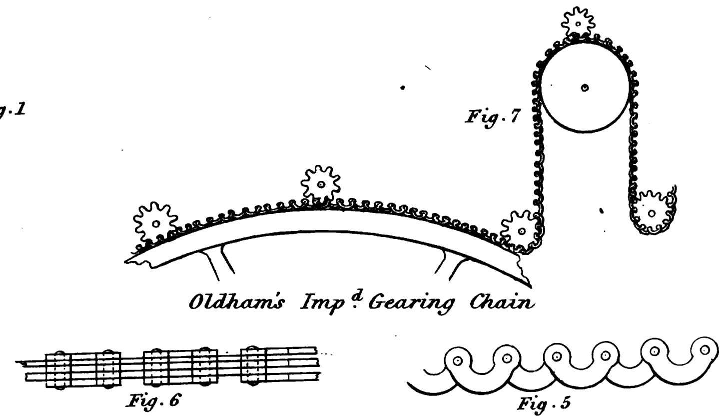




Wright's Imp.d Wheel Carriage

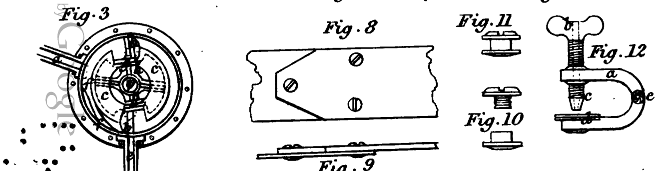


Gurney's Steam Coach



Oldham's Imp.d Gearing Chain

Budding's Strap Fastenings



W. Newton, del. — 1. Dec. 1830 — F. Mansel sculp.

SECOND SERIES.

Baily's Lace Machine.

Fig. 1.

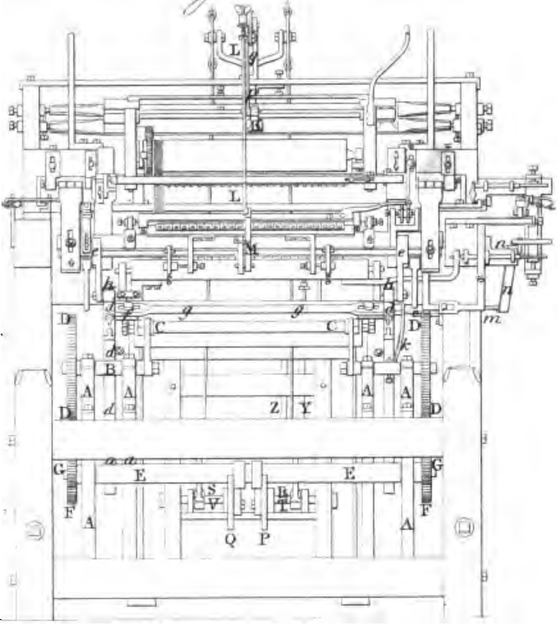


Fig. 5.

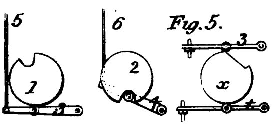


Fig. 4.

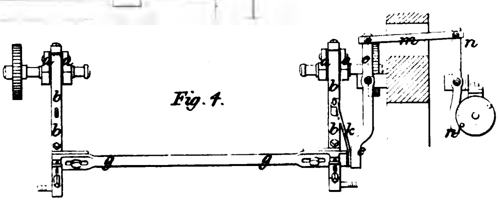


Fig. 2

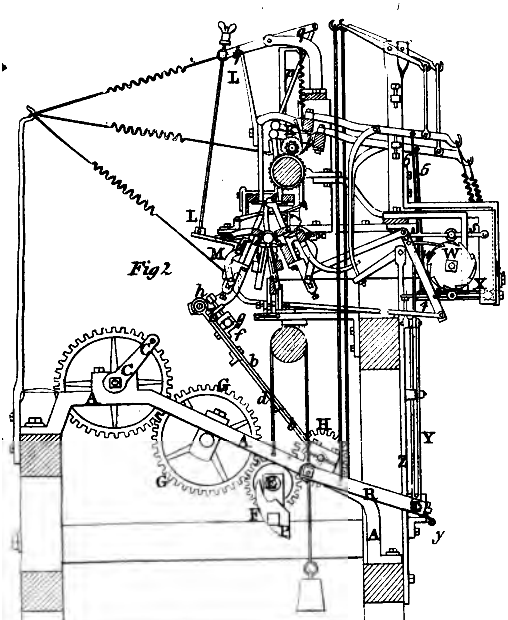
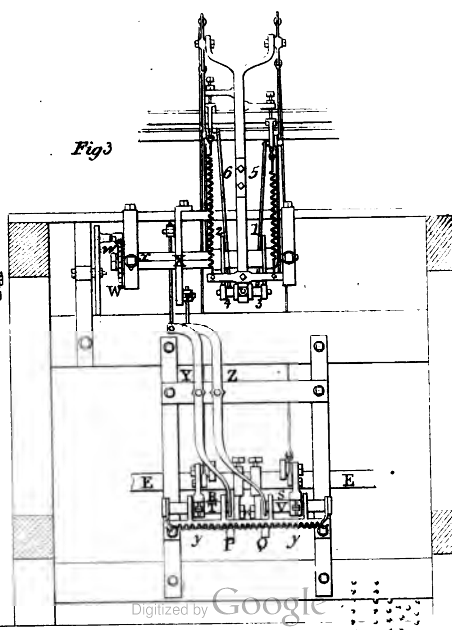


Fig. 3



W. Newton del.t

1st Jan.y 1831.

[illegible] sc.

Galloway's Propelling apparatus

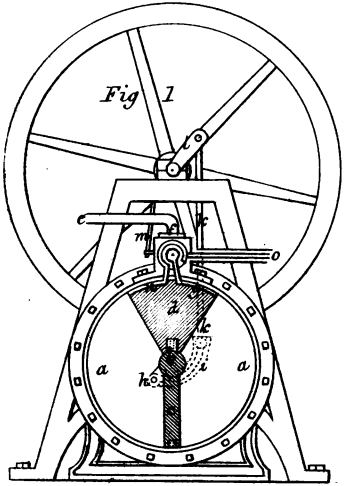


Fig 1

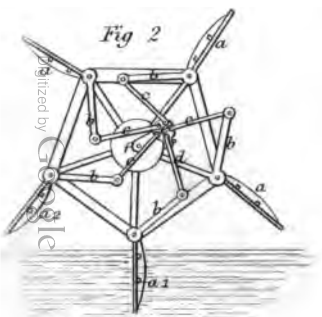


Fig 2

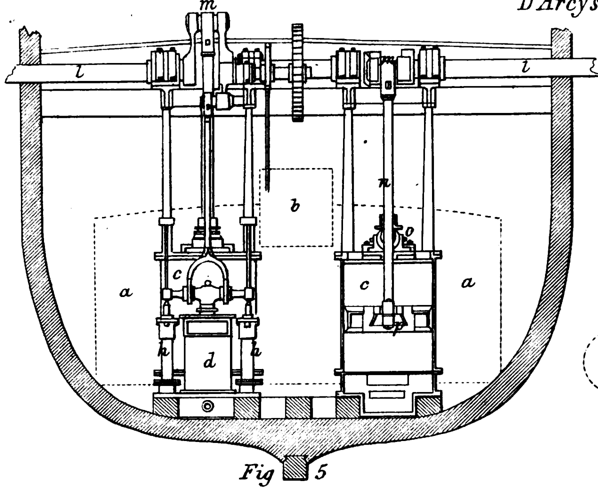


Fig 5

D'Arcy's Steam Engine

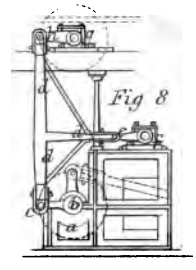


Fig 8

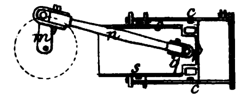


Fig 7

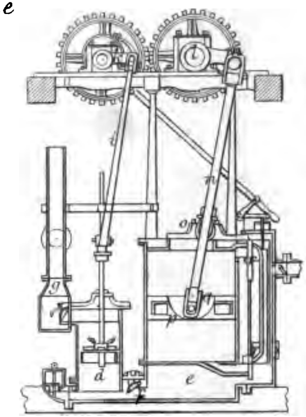


Fig 6

Sowerby's Windlafs

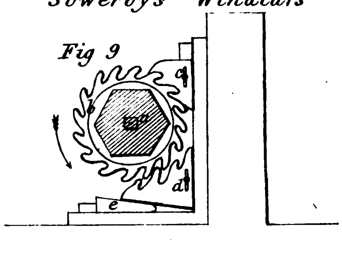


Fig 9

Budding's Mowing Machine

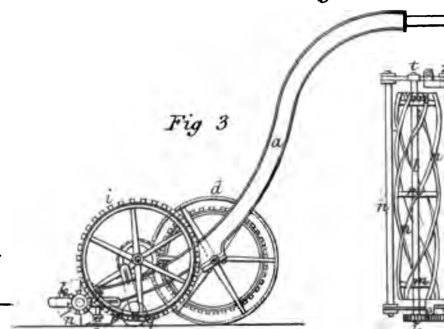


Fig 3

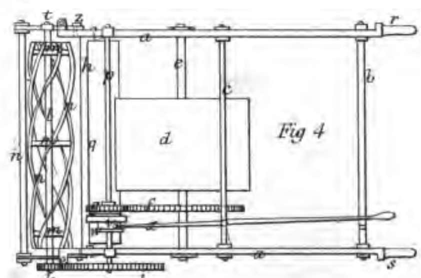
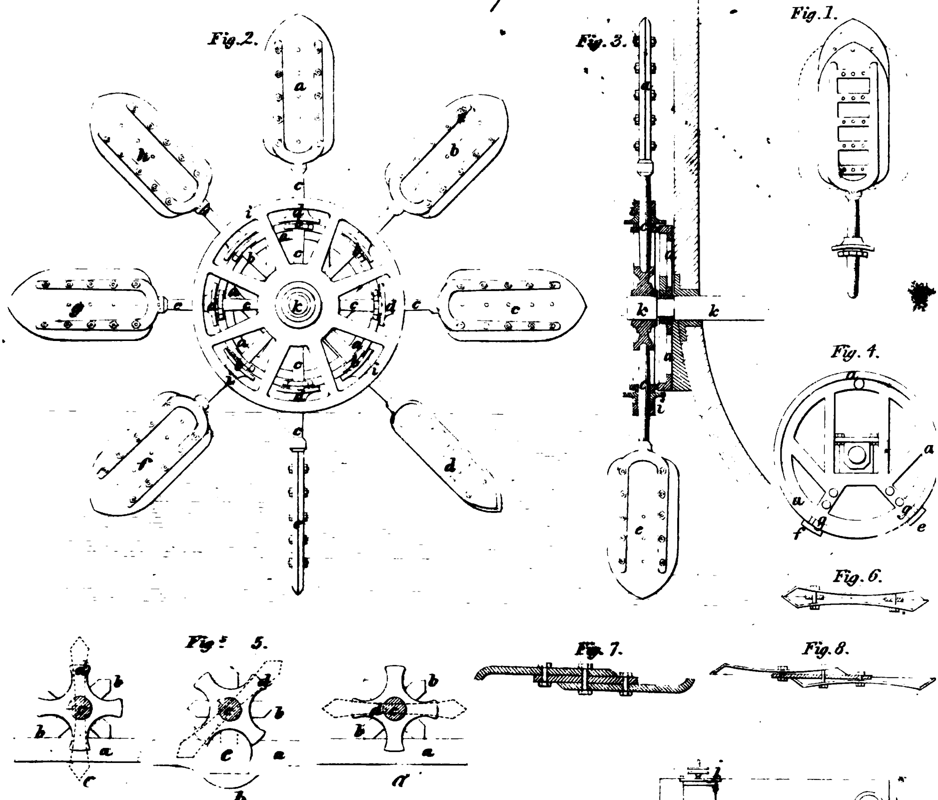
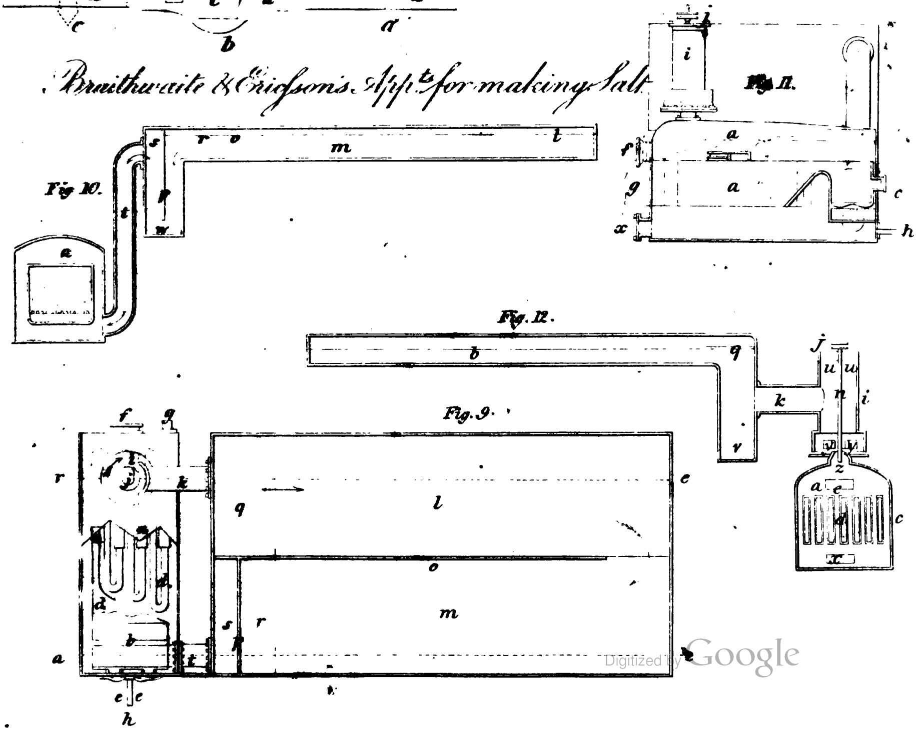


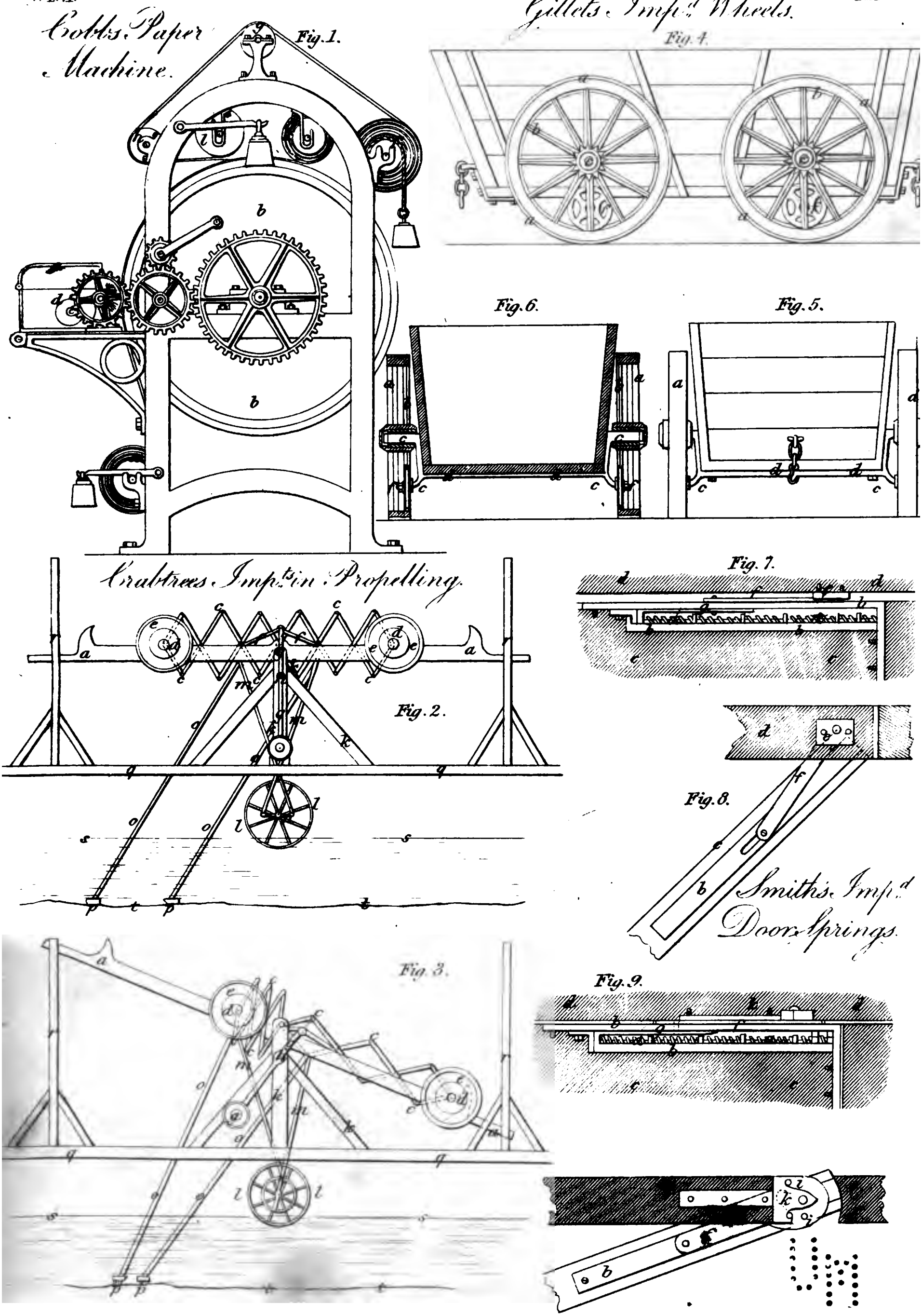
Fig 4

C. H. Williams's Impd. Paddles.



Braithwaite & Ericsson's Appts. for making Salt




Cobb's Paper Machine.
Fig. 1.
Gillet's Impd. Wheels.
Fig. 4.
Fig. 6.
Fig. 5.
Crabtree's Impt. in Propelling.
Fig. 2.
Fig. 7.
Fig. 8.
Smith's Impd. Door Springs.
Fig. 3.
Fig. 9.

Haycraft's Imp.d Steam Engine

Fig. 5.

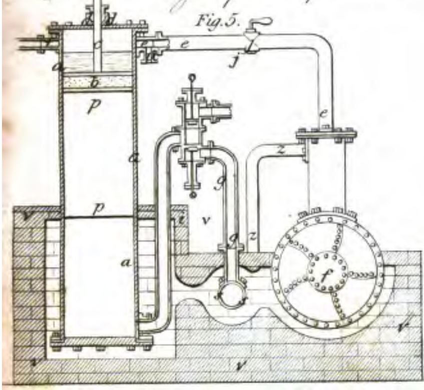


Fig. 4.

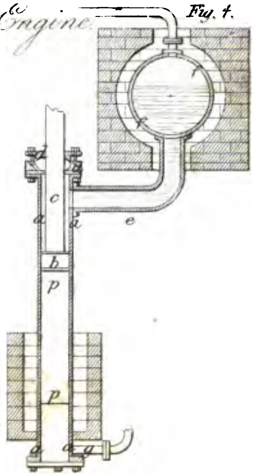


Fig. 2.

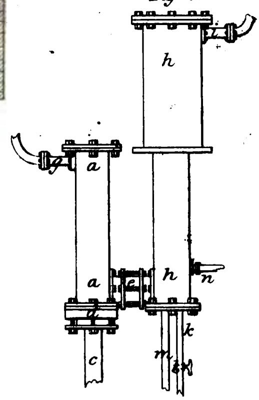


Fig. 3.

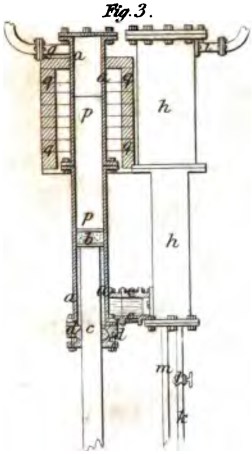
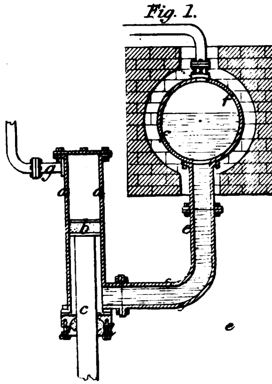


Fig. 1.



Westwood's Imp.d Watches.

Fig. 9.

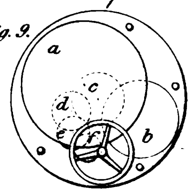
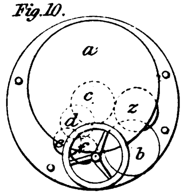


Fig. 10.



Harris Imp.d App.tus for dressing Cloth

Fig. 6.

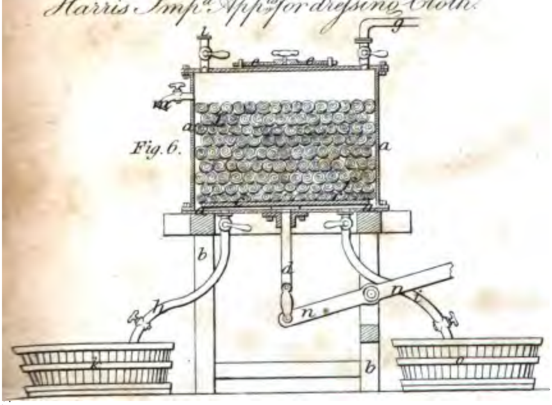


Fig. 8.

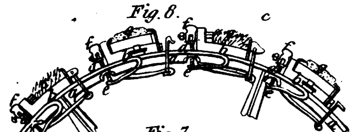
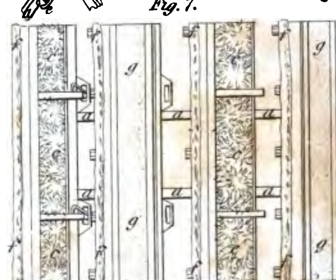
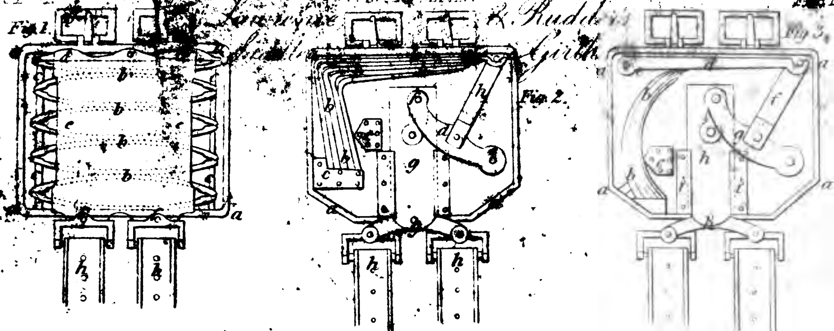


Fig. 7.



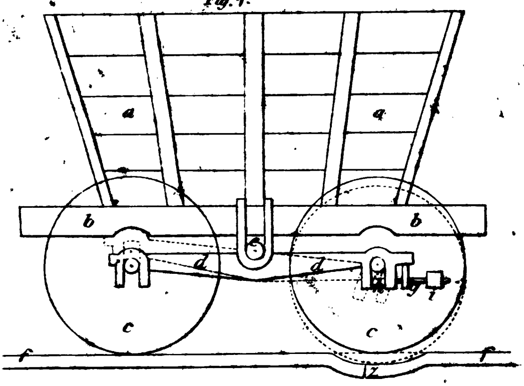
W. Newton Del.t 1st Feb.y 1831. F. Mansell Sc.

... & Rudd's ... Girth



Chapman's Tram Waggon

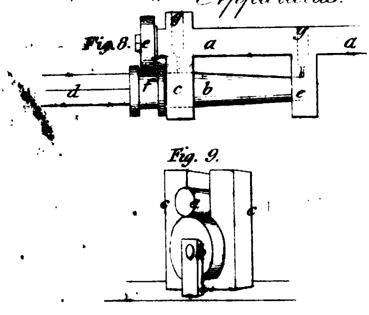
Fig. 4.



Spong's Antifriction Apparatus.

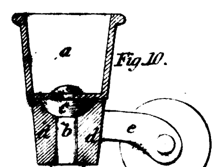
Fig. 8.

Fig. 9.



Gaithner's Imp.d Castor

Fig. 10.



Melville's Propelling App.ts

Fig. 5.

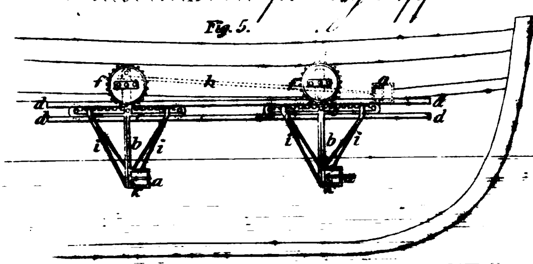


Fig. 6.

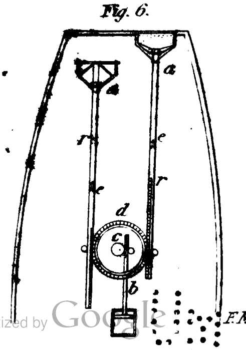
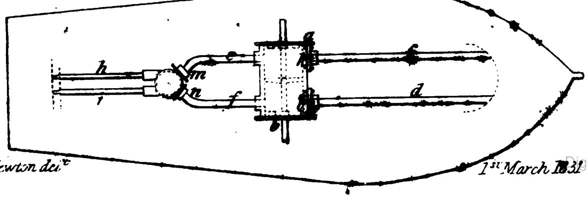


Fig. 7.



W. Newton del.t 1st March 1831 F. Mansell